WOMEN'S INITIATION OF A MORE PHYSICALLY ACTIVE LIFESTYLE AFTER A CARDIAC EVENT: PROCESSES, PATTERNS AND INFLUENCES

Valerie Hoey Lunsford

A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the School of Nursing.

Chapel Hill
2006

Approved by:

Advisor: Barbara Germino

Reader: Linda Beeber

Reader: Eileen Burker

Reader: Catherine Fogel

Reader: Pamela Pletsch

ABSTRACT

VALERIE HOEY LUNSFORD: Women's Initiation of a More Physically Active Lifestyle after a Cardiac Event: Processes, Patterns and Influences
(Under the direction of Barbara Germino)

In the U.S., coronary heart disease is the leading cause of death and disability in women over the age of 50. Increasing physical activity is a major component of cardiac rehabilitation programs; but physical activity behaviors decline dramatically during the months following a cardiac event, especially for women. Little is known about the processes of women's adoption of a more physically active lifestyle or the factors involved. Therefore, the purpose of this dissertation was to describe and explore, for women participating in a 12 week formal, Phase II CR program, intra-individual patterns of change in the processes of recovery, specifically in adopting increased levels of physical activity.

The first article provides an integrative review and critique of the current research examining self-efficacy and physical activity behaviors in older women and women with CHD. The literature is characterized by a limited number of women in the studies of individuals with CHD, a reliance on self-reports for the measurement of behavior, and a limited assessment of the process of health behavior change.

The second article presents the results from the study of 20 women who were followed during their 12 weeks of participation in a program of cardiac rehabilitation. At baseline, 4, 8, and 12 weeks, the women completed measures of physical activity (pedometer) and a

variety of psychosocial and behavioral assessments. Findings indicated that most (80%) women's physical activity declined during the last month of rehabilitation. Self-efficacy expectations for walking and for overcoming barriers to physical activity also declined during the last month of rehabilitation. Most women reported being neutral about goal setting activities, indicating that goal setting was not an important behavior change strategy. Implications for clinical practice and future directions for research are suggested.

The third article discusses the findings related to social comparisons (comparing one's situation and behaviors to others) gathered from a questionnaire and open-ended interviews. Social comparisons did not seem to be a major psychosocial factor in adjusting to heart disease or in increasing physical activity levels. Rather, women relied on feedback and input from their physicians and from the exercise staff for gauging their progress.

ACKNOWLEDGEMENTS

I would first like to thank my dissertation chair and advisor, Dr. Barbara Germino, for her expert guidance and unending patience throughout this process. You have always shared generously of your time and expertise in helping me develop my ideas and develop my writing skills. You have provided me encouragement and support at those critical times when I most needed both. I would also like to thank my dissertation committee members for sharing their time, expertise, and ideas in helping me develop my dissertation research. I would like to thank Dr. Mark Weaver, an unofficial committee member, for his guidance and input in helping me with the analysis and interpretation of the longitudinal data and with my many questions.

I would like to thank Dr. Paula Miller, Dr. William Krause, Betty Matteson, Karen Craig, Susan Marti, and the staff of the cardiac rehabilitation programs at UNC Hospitals Wellness Center at Meadowmont and the Duke Center for Living for providing me access to the women participating in their cardiac rehabilitation programs and for their support, enthusiasm, and encouragement. Additionally, I would like to thank Karen Pulido and Mark Van Horn for helping me to make those first, all important contacts with the recruitment sites. I especially would like to thank the 20 wonderful women who agreed to share their experiences, thoughts, and feelings with me during this time of growth and change.

I would like to thank my family and friends for their support during this educational journey. Thank you to my father-in-law for his support and encouragement from the beginning of my educational endeavors. Although we lost you just before I started the PhD

program, you have always been with me. Thank you to my daughter, Jessica, who has helped me with her technical knowledge and proficiency, and with much support, love, encouragement, and data entry. Thanks to my son-in-law Cooke for keeping my computer and related items functioning. Thank you to Liz, my dissertation buddy and friend. I really don't think I could have done it without you. We have shared struggles, successes, lots of laughs, and a few lunches along the way. You helped keep me focused.

I would finally like to thank my husband and partner, Pete. From the beginning of this, when you brought home the information about an accelerated program for obtaining a degree, you have always been my staunchest supporter. You have believed in me and my goals, even when I had lost sight. Thank you for your love, patience, understanding, humor, and most of all for being you. Now I'm ready for the next phase of our journey post PhD too. I love you.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1:

BACKGROUND AND SIGNIFICANCE

Statement of the Problem

Coronary heart disease (CHD) accounted for 20% of deaths from all causes in the United States (U.S.) in 2001, and claimed the lives of 687,000 Americans (American Heart Association, 2004). Historically, CHD has been regarded as a man's disease, but almost half of these deaths were in women. Thus, in the U.S. CHD represents the leading cause of death and premature disability for women as well as for men (American Heart Association). Estimates indicate that 7,800,000 adults over age 20 have experienced a myocardial infarction (MI). Three million of these survivors are women (American Heart Association). The incidence of CHD increases 2 to 3 fold in women after menopause and especially after age 70 (American Heart Association). Many of these women already bear the burdens of comorbidities and social and economic disadvantages associated with age (Rankin, 1995; Young & Kahana, 1993).

Significance

As a chronic illness, CHD represents a significant threat to independence and quality of life in women over age 50 (Speroff, 1993; Wild, 1996). Following diagnosed coronary heart disease (CHD) many women experience less favorable outcomes than men. Moreover, women experience greater difficulties with both physiologic and psychosocial adjustment to CHD. During the first year following a cardiac event (myocardial infarction (MI), coronary artery bypass surgery (CABG), or percutaneous transluminal coronary angioplasty (PTCA),

women experience a greater risk of death, cardiac distress, and reinfarction than men (Wenger, 1998; Young & Kahana, 1993). Although research specific to the adjustment and recovery of women following a cardiac event is limited, empirical evidence suggests that, compared to men, women are less physically, sexually, and socially active following a myocardial infarction (Hamilton, 1990; Hamilton & Seidman, 1993) or coronary artery bypass grafting (CABG) (Fleury & Cameron-Go, 1997). Women report more frequent emotional and physical problems following MI (Dixon, Lim, Powell, & Fisher, 2000). Moreover, women suffer more emotional distress than men (Brezinka et al., 1998; Conn, Taylor, & Abele, 1991; Low, 1993), as evidenced by higher degrees of anxiety and depression following MI (Frasure-Smith, Lesperance, & Talijac, 1993); and CABG (Artinian & Duggan, 1995).

Women experience multiple stressors in living with CHD as a chronic illness including inability to carry out daily activities, problems in dealing with treatment and symptoms, changes in roles, restricted social activities, and apprehension about the future (Wegner, 1995). Women report functional limitations related to home management activities (Artinian & Duggan, 1995; Rankin, 1995) and physical, social, and recreational activities (Brezinka, et al., 1998; Rankin). King, Rowe, and Zerweck (2000) found that women at three months post MI were returning to their normal activities at a slower rate than men. Even in the absence of serious cardiac symptomology, negative psychological responses and their associated stressors may act as significant catalysts for functional disability in women after a cardiac event (Arnold, 1997), as well as affect their participation in risk modification programs that target physical activity, diet, medications, and smoking cessation (Haskell et al., 1994; Mosca, McGillen, & Rubenfire, 1998). Interventions to assist women to cope with the

multiple stressors they experience following a cardiac event are needed to enhance and facilitate the processes of physical and psychosocial adjustment, and the initiation and eventual adherence to necessary lifestyle changes.

Formal programs of cardiac rehabilitation (CR) provide interventions to facilitate making lifestyle changes that improve physical health and psychological well-being (Ades, 2001). Increasing one's level of physical activity following a cardiac event represents a major constituent of prescribed lifestyle changes. Women evidence lower rates of CR attendance, and when they do attend they drop out in larger numbers (Conn et al., 1991). Moreover, after completing CR women demonstrate poorer rates of initiating and adhering to increased physical activity behaviors. (Blanchard, Rodgers, Courneya, Daub, & Knapik, 2002). Thus, women fail to realize the improvements and benefits conferred by engaging in a more physically active lifestyle.

Background

Cardiac Rehabilitation

Cardiac rehabilitation is the accepted standard of care for patients following a cardiac event and is central to the process of risk reduction and restoration of functional capacity (Gordon & Haskell, 1997; Miller, Balady, & Fletcher, 1997; Womack, 2003). Phase I of a formal CR program occurs during the hospitalization phase. Phase II CR programs are conducted with out-patients and include interventions in exercise training, risk factor management and modification, and some provide psychological counseling and stress management (Ades, 2001). In a joint scientific statement the AHA and the Association for Cardiovascular and Pulmonary Rehabilitation (AACVPR) state that CR is the gold standard

for treatment of CHD and for secondary prevention of disease progression (Balady, Ades, Comoss et al., 2000).

The initiation and maintenance of cardiovascular lifestyle changes by individuals, including management of hypertension and dyslipidemias, cessation of smoking, dietary modifications, and engaging in regular physical activity, are associated with reduced death rates from CHD and with regression of atherosclerotic lesions (Haskell, Alderman, Fair et al., 1994). Additionally, rehabilitation programs have been shown to facilitate psychosocial recovery (Miller, Balady, & Fletcher, 1997). Viewed from the patient's perspective, the most significant effects of CR are within the psychological domain (Ades, 2001), with improvements noted in measures of anxiety, depression, emotional stress, and social isolation (Linden, Stossell, & Maurice, 1996). Since women enter CR programs with higher levels of disability and distress, when compared to men, women participating in CR realized comparable or even greater improvements in functional capacity, QOL, psychosocial well being, and CHD risk factor reduction (Houston-Miller, Taylor, & Davidson, 1990; Cannistra, Balady, O'Malley, Weiner, & Ryan, 1992; Lavie & Milani, 1995). However, fewer women enroll in CR (Conn, Taylor, & Abel, 1991) and more drop out (Oldridge, 1991) compared with their male counterparts. Women have identified multiple barriers to physical activity including poor self-esteem, high levels of perceived stress, the lack of money, time, and skills (Mosca, McGillenn, & Rubenfire, 1998), fear of having a heart attack while exercising, and experiencing anginal pain in the morning (Blanchard et al., 2001). These barriers and women's dissatisfaction with the formats of formal CR programs contribute to poor adherence to CR and suggested lifestyle changes (Moore & Kramer, 1996).

Health Behavior Change

Health behavior change represents a process that begins with the initiation or adoption of a specific behavior and is followed by adherence to that behavior (Fleury, 1992). These changes in health behavior involve different decisional processes (Fleury). Although initiation and maintenance of behavior differ, logically initiation must precede maintenance. Lifestyle changes can be observed as they progress from the initiation of behavior changes such as diet, physical activity, and smoking, to risk factor reduction (decrease in BMI, improved physical fitness, and smoking cessation), and to the ultimate reduction in clinical events (Lear, Ignaszewski, Laquer, Pritchard, & Frolich, 2001). In order to better understand the processes of health behavior change studies are needed to investigate the influence of psychosocial factors on the adoption of lifestyle changes (Graves & Miller, 2003; Toobert, Glasgow, Nettekoven, & Brown, 1998) and the processes through which lifestyle changes are initiated (Fleury, 1992). Future research needs to examine self-efficacy expectations, perceived barriers, and age as predictors of exercise at different stages of health behavior change (Conn, 1998). Description and examination of the temporal patterns of biological and psychosocial processes following a cardiac event, as they vary with perceived self-efficacy and ultimately with a more physically active lifestyle, may provide important information for the timing and design of interventions to assist women in successfully adopting heart healthy behaviors. The patterns and processes of initiating lifestyle changes could have implications for maintenance behaviors as well.

Adherence to a more physically active lifestyle following an MI or coronary revascularization has been examined (King et al., 2000; Moore, Ruland, Pashkow, & Blackburn, 1998), but scant research has provided a prospective view of the initiation of

cardiovascular lifestyle changes. The CR environment provides an ideal setting in which to study the process of behavior change, but few studies have done so, instead focusing on outcomes rather than process (Oldridge, Guyatt, Crow, Feeny, & Jones, 1999; Rankin, 2002; Song & Lee, 2001). Moreover, these studies did not describe individual, environmental and psychosocial factors and processes as they occurred during participation in CR or their temporal relationship to the initiation of a more physically active lifestyle.

Physical activity comprises a cornerstone of the rehabilitation prescription for recovery after diagnosed CHD (American Heart Association, 1994). In addition to physical health, other benefits of regular physical activity include health maintenance, the primary or secondary prevention of conditions such as obesity and cardiovascular diseases, and health restoration after illness. A review of the benefits of regular physical activity on CHD and CHD risk factors included decreased plasma lipids and lipoproteins, body weight and body fat reduction, and decreased blood pressure (Garber, 1997).

Clearly, by increasing physical activity patterns following a cardiac event, many benefits are accrued. In spite of the advantages, research indicates that increased physical activity behaviors decline dramatically during the months following a cardiac event, with drop-out rates during the first 6 months ranging between 30% and 70% (Miller, 1997). Women evidence even higher drop-out rates and significantly worse exercise adherence compared to men (Blanchard, et al., 2002). Moreover, they participate less in formal rehabilitation programs and engage in less leisure time activity than men (Mosca, McGillenn, & Rubenfire, 1998). Barriers to physical activity include age, comorbidities, lower self- esteem, and lack of physician recommendations (Lieberman, Meana, & Stewart, 1998; Mosca et al., 1998). Other factors include beliefs about exercise (Cousins, 2000), and experiences of fatigue and

discomfort (Moore & Kramer, 1996). Although explanatory factors have been delineated, women's lower rates of initiating and adhering to increased physical activity behaviors remain poorly understood.

Factors Influencing the Health Behavior Change Process

Contextual factors

Contextual influences include biologic, environmental, and social factors that determine the process of behavioral change (Fleury, Thomas, & Ratledge, 1997). Contextual influences are part of the interactive relationship between the person and the environment, and shape and are shaped by individual values and goals. Fleury (1992) theorizes that accurate prediction of behavior requires an association between measures of attitude and behavior and the specifics and contexts of the desired action. The process of initiating a more physically active lifestyle can be better understood when individual values, attitudes, and beliefs are included in studies of behavior change (Fleury, 1991). Moreover, multiple calls have been made for more research on the societal, cultural, ethnic, and personal factors involved in differential patterns of adoption and maintenance of lifelong physical activity (Fletcher, Balady, Blair, et al., 1996; Marcus, Dubbert, Forsyth, McKenzie, Stone, Dunn, & Blair, 2000).

Biologic factors include elements of physical and psychological functioning and well-being (Fleury et al., 1997). The individual should be able to undertake the activities and requirements of daily life as a prerequisite to the ability to initiate behavioral changes. Although women have demonstrated improvements in physical and psychological functioning after participating in CR, many women cite age and comorbidities as barriers to the initiation or maintenance of physical activity (Lieberman, Meana, & Stewart, 1998; Mosca et al., 1998). Biologic factors such as age, concurrent illnesses, and habits and

attitudes are important considerations when studying initiation of a more physically active lifestyle.

Attitudes and beliefs have been examined in relation to CR participation (Cooper, Lloyd, Weinmen, & Jackson, 1999; Missik, 1999), perception of cardiovascular risk (King, et al., 2002; Oliver-McNeil & Artinian, 2002; van Tiel, van Vliet, & Moerman, 1998), and compliance with prescribed regimens and lifestyle changes (Murray, Manktelow, & Clifford, 2000; Oliver-McNeil & Artinian). Overall, findings from these studies indicate that women and men fail to consider CHD to be related to lifestyle choices and personal risks, but rather related to stress or other aspects of the environment not within their control. These beliefs influence decisions about CR attendance and the initiation and maintenance of a more physically active lifestyle. O'Brien Cousins (2000) studied women's beliefs about exercise, and found that women age 70 or older recognized the benefits of physical activity and described them in general and non-specific terms, but their beliefs about the risks of exercise were ". . . surprisingly sensational in description and tended to be anatomically specific and sometimes disturbing" (p. P286). She theorizes that by late life, sexism and ageism have combined to act synergistically to limit older women's self- perceptions of ability, creating great concerns for personal safety.

Depression has been associated with poorer physical functioning in older adults (Ades, 1999), which directly affects one's ability to participate in some of the physically challenging activities associated with cardiovascular risk reduction. Moreover, research has demonstrated that emotional distress may directly influence participation in risk modification programs that target physical activity, diet, medications, and smoking cessation (Haskell et al., 1994; Ladwig, Breithardt, Budde, & Borggrefe, 1994; Mosca et al., 1998).

Emotional distress after MI, often manifested as depression and anxiety, has been shown to influence the course and outcomes of existing CHD (King, 1997). Findings with post-MI patients indicated that depressed individuals experienced significantly higher mortality rates than those who were not depressed, independent of their cardiac status (Barefoot, Helms, Mark et al., 1996; Frasure-Smith, Lesperance, & Talajic, 1993; 1995). However, depression and anxiety were not predictive of post- MI mortality, but were predictive of poor outcomes on a variety of physical and psychosocial function measures, including poorer compliance with suggested lifestyle changes (Mayou, Gill, Thompson et al. 2000).

Symptoms of distress in older women are more likely to be manifested as depression, rather than anxiety (Arnold, 1997). Emotional distress in women has been associated with an increased risk of dependency, diminished quality of life, decreased activity patterns, poor self-esteem, sleep disturbances, social isolation, and increased morbidity (Conn et al., 1991; Riegel & Gocka, 1995). Although research to examine factors associated with women's efforts at CHD risk modification is limited, psychosocial distress is thought to undermine efforts to modify CHD risks through lifestyle changes.

Causal evidence for a beneficial relationship between regular physical activity and the prevention and improvement of psychological outcomes such as depression, anxiety, perceived stress, and well-being is inconsistent (Morgan, 1997). However, a growing body of research, as well as the popular literature supports the psychological benefits of regular physical activity.

Environmental factors

Empirical findings increasingly support the link between contextual factors, such as low socioeconomic status (SES), and the development of or poor recovery from CHD (Moser,

1994; Williams, Barefoot, Califf et al., 1992). Although much of this extant research has been conducted with men, preliminary findings support the same link in women. Moreover, women, particularly older and disadvantaged women, may experience a disproportionately large share of these deleterious psychosocial factors in their lives because of social inequalities, including gender.

Women identified stress generated from home and work environments as a barrier to adherence with risk modification behaviors (Brezinka & Kittel, 1996). Individual perceptions of and reactions to stressors can influence an individual's self-efficacy and subsequent motivation to practice health promoting behaviors in addition to directly promoting or inhibiting healthful practices (Lerman & Glanz, 1997).

Social factors

Social factors play a dominant role in lifestyle changes by promoting or inhibiting efforts towards change (Fleury at al., 1997). Social factors include support from family and friends, and support from social networks, such as peer networks formed by individuals attending CR programs. Women with adequate support may find it easier to adopt healthy behaviors (Moser, 1994), since support systems may foster health-promoting behaviors. Observing someone else's successes in making lifestyle adjustments can function as a powerful source of support and motivation in the CR environment (Fleury et al., 1995). Moreover, women may respond to an MI by talking about what it means, asking questions, and seeking validation from others (Arnold, 1997; Fleury et al., 1995). Through these social processes women are able to cope with uncertainty and to better understand the meaning of lifestyle changes (Arnold).

A social factor that may inhibit efforts towards lifestyle changes is social isolation. Living alone after an MI, specifically being socially isolated and lacking emotional support is associated with an increased risk for morbidity and mortality (Brummett, et al., 1998; Case, Moss, Case, McDermott, & Eberly, 1992; Farmer et al., 1996; Knox et al., 2000). Arnold (1997) speculates that in women these negative outcomes may be the result of lifelong negative beliefs about the self and feelings of helplessness learned early in life. These negative perspectives may intensify the threat of CHD, especially when other sources of support are no longer available to offer alternate appraisals or different opinions. Moreover, socially isolated women may lack the support and the resources necessary to alter risky behaviors (Moser, 1994).

Women's social roles may create barriers to lifestyle change. For instance, family members may encourage women to continue to cook the less healthy foods the family enjoys. Because established family roles may not change, women may be discouraged from taking time for themselves (Chesney & Darbes, 1998; Kearney, 1999).

Findings of qualitative research with women following a diagnosis of CHD highlight the importance of social factors in adjusting to CHD. Women with CHD voiced the need for enhanced quality of their supportive relationships (Helpard & Meagher-Stewart, 1998), and noted that sharing experiences with friends, especially those who had heart disease, was very important in supporting their efforts at making lifestyle changes and psychosocial adjustments (LaCharity, 1997). Women participants in the qualitative research were frequently enrolled in CR programs (Fleury et al.; Johnson & Morse, Helpard & Meagher-Stewart, LaCharity), which provided them with access to role models and to other women who had experienced an MI. Through sharing experiences with other women undergoing

similar processes, women experienced normalizing and healing and were able to seek reassurance through validation with others (Benson, Arthur, & Rideout, 1997; Fleury, Kimbrell, & Kruszeweski, 1995; Johnson & Morse, 1990; LaCharity, 1997). Moreover, in this researcher's qualitative pilot work, the two women participants often discussed the influence of comparing themselves to others who had also experienced a diagnosis of CHD (Lunsford, 2000). These opportunities to make social comparisons occurred within the context of a formal CR program for one woman, and in regular Alcoholics Anonymous meetings for the second woman.

The findings from qualitative studies conducted with women further suggest that social comparison processes may function as an informal factor to facilitate adjustment to CHD (Benson et al., 1997; Fleury et al., 1995; Johnson & Morse, 1990). Social comparison is defined as any process in which the individual relates their own personal characteristics to the characteristics of others (Buunk, Gibbons, & Visser, 2002). Individuals engage in social comparison to obtain information, make self-evaluations, engage in self-enhancement (Taylor, Buunk, & Aspinwall, 1990), and make self-improvements (Helgeson & Taylor, 1993; Wood & Taylor, 1991). Kearney (1999), in a synthesis of findings from qualitative research with women recovering from illness and trauma, posits that women use downward comparison, or minimization, to measure the impact of their losses. She speculates that comparing one's self to others provides a mechanism for placing personal losses in context along a continuum of personal tragedy and facilitates reaffirmation of what one has left. Women may experience emotional distress when they see only the losses, not what is left. Kearney further states that validation from experienced others facilitates women's efforts at reconciling losses, while peer support allows women to see how others have managed

changes. A supportive environment provides a forum for relevant feedback and a venue for role modeling to occur.

Self-efficacy

Self-efficacy is the belief in one's ability to successfully accomplish an action. Different sources of self-efficacy information include vicarious experiences and role modeling (Bandura, 1989; 1997). Having available role models for specific behaviors and having peer support, both components of the CR environment, are forms of social comparisons and provide vicarious experiences. Bandura (1989) noted that people judge their capabilities partly by comparing their performances with the performances of others, and that the performances of others often serve as standards for improving one's abilities.

Bandura (1992) observes that perceived self- efficacy uniformly predicts self-regulatory success and vulnerability to relapse behaviors. Moreover, individuals with high self-efficacy initiate behavioral change, use flexibility and skills and strategies they have at hand, mobilize high levels of effort, persevere through difficulties, and show low proneness to stress and depression. Individuals with low self-efficacy easily convince themselves that their efforts are futile when they are confronted with difficulties or barriers. Oldridge (1988) identified self-efficacy as an important patient characteristic that enhances the self-regulating processes that maintain behaviors needed to reduce the risk of coronary artery disease.

Problem

In summary, older women experience poorer physical and psychosocial adjustment following diagnosed CHD compared to men (Artinian & Duggan, 1995; Brezinka et al., 1998; Conn et al., 1991; Dixon et al., 2000; Low, 1993; Frasure-Smith et al., 1993). CR is the gold standard for treatment of CHD and for secondary prevention of disease progression

(Miller, Balady, & Fletcher, 1997), and is essential to the process of risk reduction and restoration of functional capacity (Womack, 2003). Fewer women then men participate in CR (Evenson, Rosamond, & Luepker, 1998). When women participate in CR they realize comparable or even greater improvements in physical and psychosocial measures of well-being, as well as cardiovascular lifestyle changes (Cannistra et al., 1992; Houston-Miller et al., 1990; Lavie & Milani, 1995). However, women's adherence to the recommended lifestyle change of increased physical activity dissipates with time, with only 50% or fewer women continuing to exercise after six months (Miller, 1997). The process of health behavior change progresses through cycles of initiation, relapse, and reinitiation behaviors (Fleury, 1997). Much extant research has focused on physical activity behaviors six months or more following a cardiac event but little research has examined the process of initiating habitual increased physical activity.

Clearly, women could benefit significantly from engaging in higher levels of physical activity after experiencing a cardiac event, but research indicates that large numbers of women remain inactive. The CR environment provides an ideal setting in which to study the process of behavior change, but few studies have done so, instead focusing on outcomes rather than process (Oldridge et al., 1999; Rankin, 2002; Song & Lee, 2001). Moreover, little research has been undertaken to provide a prospective view of the processes and patterns of interaction between the contextual influences of biological, environmental and social factors as they occur during participation in CR, or their temporal relationship to behavioral change processes and the initiation of a more physically active lifestyle. Even less is known about women's initiation of health behavior changes and the influence of behavioral and psychosocial factors (Toobert et al., 1998). Therefore, the purpose of this study is to describe

and explore, for women who have had a cardiac event, the processes and temporal patterning of contextual factors and behavioral change processes involved in the initiation and early adoption of varying levels of physical activity while attending a formal, Phase II cardiac rehabilitation program. This information could provide a future foundation for designing individualized lifestyle interventions based on descriptions of the timing and patterns of women's behavioral change processes.

CHAPTER 2

THEORETICAL FRAMEWORK AND REVIEW OF THE LITERATURE

Introduction to the Theory of Wellness Motivation

This chapter begins with an introduction to the theory of wellness motivation, followed by a review and critique of research applying the theory to the study of individuals with CHD. The theory of wellness motivation as applied to cardiovascular risk reduction (Fleury et al., 1997) provides a model for studying the initiation of health related behavioral changes such as increasing physical activity levels. Through studying how women initiate increasing physical activity levels in their lives after experiencing a cardiac event, important descriptive information may be obtained. Moreover, the information could be used in developing future interventions to assist women with the initiation of and adherence to these lifestyle changes. Critical time points in the change process may be identified as well as factors and characteristics that could assist with description and classification of behavioral change patterns. In developing an intervention this information could be used to focus and individualize the intervention components, timing, and delivery (Sidani & Braden, 1998).

In the theory of wellness motivation, behavioral change occurs as a process of intention formation and goal-directed activity which facilitate the creation of positive health patterns (Fleury et al., 1997). The three dimensions of contextual influences, behavioral change processes, and action comprise the model (see Appendix, Conceptual Model). Each dimension is composed of factors with interactions occurring among the factors within and across dimensions. The dimension of contextual influences includes biological,

environmental and social factors. The dimension of behavioral change processes includes the concepts of self-knowledge, motivation appraisal, and self-regulation. The final dimension, action, includes risk modification and risk reduction as the main factors.

Contextual influences originate from within the individual or as part of the individual's environment, and behavioral change processes and action occur within this milieu of personal, social, and cultural factors. Contextual influences incorporate biologic, environmental, and social factors as part of the interactive relationship between the individual and the environment. They affect and are affected by individual values, goals, expectancies, and plans (Ewart, 1991). Contextual influences shape efforts at risk modification and health behavior change.

Biologic factors influence the individual's capacity to enact health behavior changes, and include individual characteristics and the physical and psychological capacities to engage in risk reduction. Although not specified, the inclusion of both physical and psychological attributes in biologic factors acknowledges a holistic view of human behavior. Fleury and colleagues (1997) note that biologic factors ". . . include the capacity to undertake the activities and requirements of daily life, as well as physical and mental well-being" (p. 28). Individual characteristics include age and gender, and influence the ability to increase physical activity as well as the desire (Murray, Manktelow, & Clifford, 2000; Oliver-McNeil & Artinian). The physical capacity to engage in health behavior change is requisite to the process of increasing levels of physical activity. Therefore, health status is an important consideration. Psychological well-being occupies a critical role in the health behavior change process since emotional distress appears to weaken CHD risk modification efforts (Haskell et al., 1994; Ladwig et al., 1994; Mosca, McGillen, & Rubenfire, 1998). Thus, biologic factors

have a direct influence on an individual's ability to engage in increased levels of physical activity.

Environmental factors consist of aspects of the physical environment which may affect risk modification efforts (Fleury et al., 1997). Environmental factors include access to resources, patient-provider interaction, perceived convenience and safety, transportation, and the individual's response to the physical and social environment. Other environmental factors include the dynamic resources of time, money and information, which are frequently characterized by measures of socioeconomic status (SES).

Social factors include influences that can work to promote or inhibit health behavior changes (Fleury et al., 1997). These influences are exerted by those people who make up an individual's social environment such as family, friends, and peers. Persons in the social environment play a central role by affecting goal setting, strategies, and opportunities to enact behavioral change (Fleury, 1993). Moreover, their influence can extend to the individual's health and sense of well-being.

The second dimension in the theory of wellness motivation is behavioral change processes. These processes indicate how goals are created and evaluated, how standards for behavioral change are instituted and strategies for change determined, and how these new patterns are regulated and strengthened (Fleury et al., 1997). This assumes that individuals have the propensity to strive towards new goals, and when achieved, to move beyond these goals to create other goals (Fleury, 1991). Behavioral change processes include the concepts of self-knowledge, motivation appraisal, and self-regulation.

Self-knowledge, an aspect of the self-concept, represents the individual's motivational needs in the form of goals and provides the means-ends patterns that are necessary for new

behavior (Markus & Nurius, 1986; Markus & Ruvulo, 1989). Self-knowledge represents the individual's potential and their representation of valued ways of being (Fleury, 1991). Markus and Nurius call this individual potential the "possible selves" and suggest that these possible selves may serve several functions. Possible selves may serve as coping strategies to effect problem-solving and emotional regulation in response to stressors (Taylor & Schneider, 1989), thereby enhancing psychosocial adjustment. They may also function as incentives, or motivation, for behavior change. The possible self is highly specified and individualized, and may play a crucial role in motivation and goal-directed behavior (Markus & Ruvulo), both of which are vital to the enactment of risk-reduction strategies. These possible selves are derived from categories made salient by individual, sociocultural and historical contexts, and from images, models, and symbols from social experiences, with either desirable or undesirable views of the self serving as impetus for behavior change (Markus & Nurius). Possible selves provide a template for goal attainment through focusing the individual's attention on thoughts and feelings that are specific and task relevant, and helping to organize a plan of action (Markus & Ruvulo). Thus, possible selves function to link current states with desired outcomes (Fleury et al., 1997). Other determinants of goal selection include the value of the goal and perceived self-efficacy, or ability, to achieve the goal (Fleury et al.).

Self-efficacy theory is a component of Bandura's Social Cognitive Theory (Bandura, 1986). Bandura conjectures that an individual's perception of their ability to accomplish a specific behavior affects their level of motivation, thought processes, emotional responses, and the actual behavior. Self-efficacy beliefs are developed from four sources of information listed here in order of influence: (a) mastery experience, or actually performing a behavior;

(b) vicarious experience, when an individual observes another successfully enact a behavior; (c) verbal persuasion involves exposure to the verbal judgment of others (Bandura), but has also been operationalized as persuasion through education (Carlson, Norman, Feltz, Franklin, Johnson & Locke, 2001; Gortner & Jenkins, 1990; Gillis, Gortner, Hauck, Shinn, Sparacino, & Tompkins, 1993); and (d) emotional and physiological states such as anxiety, stress, arousal, and fatigue.

An individual's behavior specific self-efficacy beliefs are developed through expectancies regarding how events are connected, what the outcome expectancies, or the consequences of a behavior will be, and whether one is competent to accomplish a specific behavior (Bandura, 1986). When a new behavior is enacted, the individual receives feedback about the behavior from two sources. First, when the behavior produces the desired results, outcome expectancies are met. Second, when the behavior produces the expected results, the individual experiences confidence, or enhanced efficacy, in carrying out the behavior. Both forms of feedback are likely to result in the behavior being repeated. Bandura postulates that self-efficacy expectations are more potent in determining behavior than outcome expectancies, but research has shown that both may operate in shaping behavioral choices (Clark & Dodge, 1999; Conn, Burks, Pomeroy, Ulbrich, & Cochran, 2003; Resnick, Palmer, Jenkins, & Spellbring, 2000). Self-efficacy beliefs and outcome expectancies are fluid and dynamic, changing in relation to different behaviors and situations. Thus, self-efficacy and outcome expectancies occur as components of a process of behavioral change and regulation.

Motivation appraisal constitutes a crucial step in the change process as it guides the formation of intentions to initiate and maintain behavioral change (Fleury et al., 1997). This serves as an indicator of individual readiness to initiate change. A plan of action serves as a

map for mobilizing goal-directed behaviors and is generated from an assessment of personal goals and means for goal-attainment. Specific strategies that are most congruent with personal goals and perceived abilities are developed through cognitive representation and problem-solving. Behaviors are interpreted based on these strategies and future behaviors are planned to achieve desired outcomes. Identifying barriers to change and making a strong commitment to change facilitate goal achievement (Fleury, 1991). The identification of potential barriers to successful behavior change provides an anticipatory mechanism for choosing alternatives for goal achievement, while a strong commitment to change promotes greater effort toward achieving desired goals (Fleury, 1996).

Self-knowledge and motivation appraisal guide goal determination and intention formation, but the behavioral change process requires an understanding and assessment of how goal-directed activities are regulated and sustained (Fleury et al., 1997). Self-regulation, broadly and simply defined, refers to any effort by a human being to alter its own responses (Baumeister, Heatherton, & Tice, 1994). These authors note that self-regulation stops one response from occurring and substitutes a response (or lack of response) in its place. These behaviors describe the transformation of goal intentions into personalized action (Fleury et al.). The concept of self-regulation incorporates cognitive, affective, and behavioral strategies used to make behaviors congruent with valued goals (Bandura, 1989; Fleury, 1991; 1996). These strategies are particularly relevant when goals conflict or change over time. Although self-regulation is an essential component of long-term adherence to behavior change, schemas for self-regulation would also be necessary when initiating and adopting a behavior. Failure to make plans for managing the usual responses that are being replaced result in resorting to old behaviors that are learned or habitual, and thus a failure of self-regulation

(Baumeister et al.). Moreover, for successful change to occur, individuals need strategies to effectively respond to contextual influences such as social and environmental pressures (Fleury et al.).

The final dimension of the theory is action, which encompasses contextual influences and the behavioral change processes. Action includes behaviors enacted to modify risk factors and the actual reduction of those risk factors. For example, an individual undertakes a program of regular physical activity to modify their risk factor of sedentary lifestyle. They accomplish this goal by incorporating short periods of moderate intensity (60% to 75% of maximal capacity) activity (approximately 5 to 10 minutes) that total 30 minutes on most days (Fletcher, Balady, Blair et al., 1996) on a regular basis for 3 months. As a result of this health behavior change the individual experiences a physiologic response as evidenced by improvements in measures of physical fitness, and changes in markers of physical activity (or inactivity) such as body mass index (BMI). Operationalization of the concepts involved in action benefits from the use of multiple measures to examine different levels of action related to behavioral change. Measures can include objective evaluations, subjective responses, and physiologic or biologic responses (Fleury et al.).

The theory of wellness motivation incorporates concepts from deductively generated behavioral models to explain the initiation of lifestyle change efforts and the maintenance of sustained behavioral change (Fleury et al., 1997). However, the theory goes beyond the more traditional behavioral models by including concepts specific to the individual, such as the influence of factors that may function as barriers to behavior change, as well as the influence of individual values and goals (Fleury et al.). Moreover, the wellness motivation theory allows for investigation of the processes through which changes in health behaviors occur.

Traditional theories of health behavior change provide for the observation and prediction of behaviors, but may not include the multiple individual and environmental factors that influence the initiation and maintenance of behaviors as they change over time (Brown & Moskowitz, 1998; Fleury, 1992).

Empirical Support for the Theory

Few studies have been conducted using the theory of wellness motivation as a framework for empirical research. Two small, cross-sectional studies provided a test of the theory (Fleury, 1995) and a test of the theory's predictive ability (Fleury, Harrell, & Cobb, 2001). Fifty-eight individuals enrolled in a formal program of CR participated in a study to identify motivational correlates of regular physical activity (Fleury, 1995). Clinically significant differences, although not statistically specified, were seen in the mean scores on the behavioral change process variables of self-knowledge, motivation appraisal, and self-regulation between patients engaging in regular physical activity and those not engaging in regular physical activity. However, these findings provide little empirical support for the theory.

The proposed study uses this theory, but moves beyond a snapshot view of an involved process that occurs over time, to a fuller description with repeated measures of the process of enacting lifestyle changes after a cardiac event.

Introduction to the Study Model

Articles chosen for review and critique were selected for their relevance to the substantive, theoretical, and methodological considerations for the proposed study. Initial literature searches included the concepts of CHD, physical activity, and women along with specific concepts involved in each link (e.g. self-efficacy or social comparisons). In instances where

research with clinical populations was limited, search parameters were conducted for non-clinical populations. In the absence of research related specifically to physical activity, the concept of health behavior or lifestyle change was substituted. Since the literature is characterized by limited research with women, relevant studies including or conducted with men were added with the acknowledgement that generalizability was restricted.

According to Peplau (1997), a theory that describes a process such as behavioral change represents multiple concepts. Concepts explain a narrow range of behaviors but when organized and integrated they explain a broader range of behaviors. A process represents an organization of these concepts into phases or stages. The stages include a serial arrangement of the concepts designed to elucidate the emergence of specific behaviors. Health behavior changes following lifestyle interventions are observed first as changes in behavior, followed by risk factor reduction, then fewer clinical events (Lear et al., 2001). Thus, the format of a process theory provides a structure for making observations. The theory of wellness motivation provides a suitable model for this proposed study in which the processes women employ when initiating a more physically active lifestyle will be described and explored.

The theory of wellness motivation provides a complex model with phases and multiple concepts and sub concepts that are organized to examine process. Studying process offers an opportunity to observe the dynamics of behavior over time by placing the behavior in the temporal context in which it occurs (Brown & Moskowitz, 1998). Single occasion measurement assumes that psychological and physical indices of behavior change are static or slow-changing. Temporal or process measurement allows the exploration of situational or contextual correlates and determinants of health behaviors. The study of process permits the observer to determine the extent to which behavior reflects stable characteristics rather than

state, pinpoint important temporal antecedents of physical or psychological events, shed light on the adaptive or maladaptive significance of the behavior in terms of the context in which it is expressed, and serve as a guide to health behavior interventions (Brown & Moskowitz). The process approach to studying health behavior change offers an idiographic and nomothetic view of these complex human endeavors.

The theory of wellness motivation is complex and incorporates stages for examining the process of health behavior change. This complexity can provide rich data, but can also be difficult to study. Process measurement, which requires multiple data points and intensive data collection, adds another source of complexity in studying health behavior change (Brown & Moskowitz, 1998). The increasing complexity can result in a significant respondent burden and intrusiveness for participants. Because this proposed study is a dissertation project and a first step in a program of future research, the model for this proposed study will limit the number of concepts involved.

The complexity of a process design requires focusing upon one or a small set of behaviors (Brown & Moskowitz, 1998). This proposed study will focus on the health behavior change of increased physical activity. Women identified increasing their levels of physical activity as a top priority for lifestyle change (Mosca et al., 1998). Research provides support for the importance of self-identified goals as a marker of recovery and as motivators (Oldridge, Guyatt, Crowe, Feeny, & Jones, 1999). The level of physical activity for focus will be regular leisure-time physical activity. Regular leisure-time physical activity was defined as engaging in light to moderate leisure-time physical activities for equal to or greater than 30 minutes equal to or greater than 5 times per week or engaging in vigorous leisure-time physical activities for equal to or greater than 20 minutes equal to or greater than 3 times per week

(Healthy People 2010). Research supports the beneficial effects of this level of physical activity. The AHA identifies that the most beneficial effects of physical activity on cardiovascular disease mortality can be attained through moderate-intensity activity (Fletcher, Balady, Blair et al., 1996). In a quantitative meta-analysis of 127 intervention studies, effects for active leisure time were larger then exercise programs prescribing strength, aerobic exercise, or aerobic exercise combined with other fitness activities (Dishman & Buckworth, 1996). This was further supported by an integrative literature review examining intervention effects on CVD risk factors in which women responded better to lifestyle physical activity recommendations than to structured exercise recommendations (Krummel, Matson-Koffman, Bronner, Davis, Greenlund, Tessaro et al., 2001).

Behavior change consists of two stages, the initiation or adoption stage and the adherence or maintenance stage. Maintenance or adherence behavior is defined as the continuation of physical activity behavior beyond six months following adoption (Marcus et al., 2000). A successful behavior change occurs when a previously sedentary individual meets Centers for Disease Control (CDC)/ American College of Sports Medicine (ACSM) recommendations for regular physical activity for at least six months. Consequently, the adoption or initiation phase of health behavior change occurs during the first six months of activity prior to achieving maintenance. This study proposes to investigate the initiation phase of health behavior change as it occurs during participation in a formal program of CR. Studies have examined adherence to a more physically active lifestyle following an MI or coronary revascularization (King et al., 2000; Moore, et al., 1998), but little is known about the initiation of cardiovascular lifestyle changes.

Contextual Influences

Contextual influences include biologic, environmental, and social factors (Fleury, et al., 1997). Research supports the importance of biological, psychosocial, relational, and cultural factors in influencing lifestyle practices (Toobert et al., 1998). In a review of the physical activity literature, Marcus and colleagues (2000) summarized the statistics and reported that sedentary behavior is more prevalent for women, older adults, the less educated, the poor, and ethnic minorities. People with disabilities and chronic illness are also less likely than those without disabilities to report regular moderate physical activity. Moreover, findings from the Women and Physical Activity Survey, part of the Women's Cardiovascular Health Network Project, identified that personal, social, environmental, cultural, and physical environmental factors were strongly associated with physical activity status among a diverse group of women (Eylar et al., 2003).

Biologic Factors

This research proposes to study the contextual biological factors of age, health status, and emotional distress. A group of studies addressing age, health status, and emotional distress will be summarized and critiqued.

Age. Research indicates that the prevalence of women's physical inactivity increases with advancing age (USDHHS, 1996). In 2000 the USDHHS reported that only 15.2% of women between the ages of 25 and 64 reported engaging in light or moderate leisure-time physical activity. Moreover, women identified age as a barrier to the initiation or maintenance of physical activity (Lieberman, Meana, & Stewart, 1998; Mosca, et al., 1998). Even in the process of behavior change, age exerted a negative influence on outcome expectancy, self-efficacy beliefs, and exercise behavior of older adults (Conn, 1998). Age influences self

judgments, and therefore self-efficacy (Conn et al, 2003). Thus, age is an important concept to include in a study of women's initiation of increased levels of physical activity following a cardiac event.

Age is a variable consistently included in studies as part of the sample description; however a group of studies evaluated age as a predictor variable for varying levels of physical activity. Age predicted physical activity behaviors in half of the studies (Cloutier Laffery, 2000; Marchionni, Fattirolli, Fumagalli, Oldridge, Del Lungo, Bonechi, et al., 2000; Mo-Kyung, Sanderson, Weaver, Giger, Pemberton & Klapow, 2004; Yates, Price-Fowlkes, & Agrawal, 2003). Another group of studies indicated age was not directly predictive of physical activity behaviors, but indirectly predicted activity through goal strategies (Conn et al., 2003) and through self-efficacy and outcome expectancies (Resnick et al., 2000). In a large, multi-state, multi-site cohort, age was not directly or indirectly related to physical activity (Eylar et al., 2003). In this sample the women's ages ranged between 20 and 50 years, describing a younger group than those described in the studies finding age predictive of physical activity, such as the study by Marchionni and colleagues (2000) in which the decrements in physical activity were associated with increasing age. A study of African American women residing in the south included participants whose ages ranged from 20 to 50 years, although the authors did not include age as a personal correlate of physical activity (Ainsworth, Wilcox, Thompson, Richter, & Henderson, 2003. These studies fail to provide consistent support for the influence of age on physical activity. However, age is an important descriptive variable that will be retained as a biologic factor.

Health status. The physical capacity to engage in a more physically active lifestyle is a necessary component of the health behavior change process. In individuals with CHD,

physical capacity may be characterized by disease-related factors such as cardiovascular function, risk factors for CHD, and associated comorbidities (Fleury et al., 1997). Studies of secondary prevention in cardiac patients revealed that about 20% to 30% of participant noncompliance resulted from medical contraindications such as a high cardiovascular risk profile and excess body weight (Blair, Horton, Leon, Lee, Drinkwater, Dishman et al., 1998). Several large scale studies reported the influence of physical capacity on physical activity. Data from the Framingham Disability Study suggested that CHD was a major predictor of activity limitations with women reporting more disability than men (Pinsky, Jette, Branch, Kannel, & Feinleib, 1990). Other studies with women have identified additional limitations of physical capacity including more comorbidities (Ades, Waldmann, Polk, & Coflesky, 1992), more cardiac risk factors (Cannistra et al., 1992), and troubling cardiac symptoms (Kimble, 2001).

Kimble (2001) conducted a study of particular relevance to women with CHD in which she described the impact of cardiac symptoms on perceived ability to perform household tasks. Findings indicated that women perceived significant limitations on their ability to engage in usual household tasks because of cardiac symptoms. These perceptions persisted even when there had not been a recent cardiac event. The performance of household tasks is considered a moderate level activity within lifestyle activity parameters (Healthy People 2010), but women reported having difficulty with this very familiar and basic level of activity. This finding suggests that the inclusion of more vigorous physical activity, usually involved with a structured exercise program, may not seem desirable or feasible, and may account for the large number of women remaining sedentary after a cardiac event.

Quantitative studies evaluating the ability of health status to predict physical activity provide consistent support. Mo-Kyung and colleagues (2004) reported a significant positive correlation between baseline health status and physical activity. Other researchers found health status predictive of a variety of physical activity behaviors when health was perceived as good (Eylar et al., 2003) and as very good or excellent (Ainsworth et al., 2003). Women who viewed themselves as healthy reported increased activity levels when compared to women reporting poor health (Eylar et al., 2003). These findings provide support for the proposition in social cognitive theory that perceived health status plays an important function because self-referent thought strongly influences behavior (Bandura, 1990).

Yates et al. (2003) conceptualized health status as symptom distress in a cohort of elderly adults following a cardiac event. Results demonstrated an inverse relationship between symptom distress and physical activity with higher levels of symptom distress predicting lower levels of physical activity. In addition to finding an indirect association of age with physical activity behaviors, Conn et al. (2003) and Resnick et al. (2000) also found indirect relationships between health and goal strategies, self-efficacy and perceived barriers. Consistent support from correlational studies suggests that health status has an influence on physical activity behaviors and on aspects of the change process. Therefore, the proposed study model will include multiple measures of health status.

Emotional distress. The biological factor of emotional distress, defined as symptoms of depression or anxiety, will be included in this proposed study. The concept of emotional distress appears incongruent with the dimension of biological factors. However, the wellness motivation theory assumes a holistic perspective in which physical and psychological well-being are both requisite for health behavior change (Fleury et al., 1997). Support exists

linking the presence of emotional distress with difficulties in enacting health behavior changes. Emotional distress has been associated with decreased participation in risk modification programs (Haskell et al., 1994; Ladwig et al., 1994; Mosca et al., 1998), decreased activity patterns (Conn, et al., 1991; Riegel & Gocka, 1995), and decreased cardio-respiratory fitness (Hollenberg, Haight, & Tager, 2003). Moreover, depression and anxiety predicted poorer compliance with suggested lifestyle changes in a large scale study of the relationship between anxiety and depression and a variety of outcomes following an MI (Mayou et al., 2000). Qualitative findings suggest that emotional distress in women may be associated with feelings of anger at themselves, and guilt at having "caused" the cardiac event (Fleury, Sedikides, & Lunsford, 2001).

Five studies assessed some type of emotional distress in relation to persons with CHD and physical activity. In a telephone survey of 204 women with self-reported CHD, 57 % of the respondents reported symptoms of anxiety and depression since having been diagnosed with CHD (Marcuccio, Loving, Bennett, & Hayes, 2003). In this same survey, more than 85% of the women reported not following recommended lifestyle modifications. In a study by Marchionni et al. (2000) the presence of depressive symptoms demonstrated an independent association with lower exercise tolerance in 265 post-Mi patients. In a cohort of 62 study participants, who were assessed 6 to 12 months following an MI, negative well-being was associated with lower levels of physical activity (Yates et al., 2003). The path analysis reported by Resnick and colleagues (2000) indicated that mood indirectly influenced exercise behaviors through self-efficacy, which the authors likened to motivation for increasing physical exercise.

Hollenberg et al. (2003) designed a study to better describe the exercise capacities and characteristics of depressed women and the effects of depression on cardiovascular risks. They undertook the study to explain the differences in outcome when physical activity or physical fitness is assessed. Women age 55 and over with no major illness participated, with 663 completing baseline measures and 363 completing measures at 4 years. Measures of depression, exercise characteristics, and physical fitness were obtained at baseline and at two and four years. Depression was assessed by self-reported symptoms and antidepressant use. Findings indicated that women classified as depressed demonstrated more risk factors for CHD, lower measures of exercise capacity, lower measures of cardio-respiratory fitness, lower reports of leisure activity, and higher drop out rates between baseline and four years, even after accounting for age and a previous diagnosis of CHD. Moreover, women reporting depressive symptoms while on antidepressant medication evidenced the worst results in all measures.

Critique. Some methodological issues and considerations exist in this group of studies. The theoretical or empirical support for each study was not always clear. Conn, Burks and colleagues (2003) incorporated concepts from four theories, and although the concepts overlap between theories and are interrelated, a clear understanding of each concept, as defined within each theory, becomes difficult. The study by Resnick et al. (2000), examining factors that influence exercise behavior, did not specify the stage of exercise behavior. The failure to define whether initiation or adherence behaviors are being studied creates a conceptual gap and limits the applicability of study findings. Eylar et al. (2003) developed the list of contextual influences for quantitative analysis from qualitative interviews conducted with women. This represents a strength of this particular study, although the

authors reported that not all factors obtained from qualitative research were significant when tested in quantitative research.

Sample sizes and characteristics of these studies varied widely. Sample sizes in these non-experimental studies were generally large, ranging between more than 3000 (Eylar et al., 2003), 600 and 1000 (Hollenberg et al., 2003; Ainsworth et al., 2003), 200 or more (Conn, Burks, et al., 2003; Marchionni et al., 2000; Marcuccio et al. 2003), and less than 200 (Mo-Kyung et al., 2003; Resnick et al., 2000; Yates et al., 2003).

Three studies enrolled samples from multiple states and multiple sites (Ainsworth et al., 2003; Eylar et al., Marcuccio et al., 2003), providing greater ethnic and racial diversity, and thus greater generalizability. However, these studies looked at younger, well women between 20 and 50 years, limiting generalizability to older women with chronic diseases. Older, well, community-dwelling women made up the samples in three studies (Conn, Burks et al., 2003; Hollenberg et al., 2003; Yates et al., 2003). These studies provide important data about older women and the contextual factors that affect their physical activity behaviors, although the findings have limited applicability to women dealing with CHD.

Four studies evaluated physical activity correlates in persons with CHD. Women, identifying themselves as having CHD, participated in a telephone survey conducted by WomenHeart (Marcuccio et al., 2003). This level of self-selection creates a lack of objective validation of the study inclusion criteria, possibly limiting the validity of the sample's representativeness. Three studies examined men and women with CHD (Marchionni et al., 2000; Mo-Kyung et al., 2003; Yates et al., 2003). Although data were analyzed by gender in these studies, women comprised only 22.5% and 31.5% of the study samples (Mo-Kyung et al., Yates et al.), while women were 83% of Resnick's et al. sample (2000), and 22 %

(Marchionni et al.) of the study samples. These studies are limited by the preponderance of cross-sectional, correlational study designs, although all were prospectively conducted.

In the studies reviewed and critiqued, only two studies used a longitudinal, repeated measures design (Hollenberg et al., 2003; Mo-Kyung et al., 2003). The work by Mo-Kyung and colleagues is limited by its retrospective design and secondary analysis of data. Although strengthened by a longitudinal, repeated measures design, data collection occurred every two years in the study conducted by Hollenberg et al. The extended intervals between data collection may partially account for the almost 50% sample attrition. Long intervals between data collection points create an assumption of stasis in behavioral change rather than allowing observation of the dynamic processes and interplay among factors (Brown & Moskowitz, 1998). Moreover, points of vulnerability for increased sedentary behavior occur at different stages (Marcus, et al., 2000), and may be missed by single occasion measurement, or measurement separated by long intervals (Brown & Moskowitz).

Definitions, both conceptual and operational, comprise the study area with the most methodological concerns. Health status is variably defined by AACVPR risk stratification (Mo-Kyung et al., 2003), items on the SF12 (Resnick et al., 2000), and positive well-being from the vitality subscale of the SF36 (Yates et al., 2003). Comparison of health status and its influence between studies becomes difficult when measures are not comparable. An additional limitation in the measurement of study variables is the lack of corroboration with objective measures of health status, instead relying solely on self-report measures.

Little consensus exists over the conceptual definition of physical activity. Physical activity is broadly defined in these studies, ranging from physical fitness (Hollenberg et al., 2003) to exercise (Conn, Burks et al., 2003), and exercise tolerance (Marchionni et al., 2000), to daily

physical activities (Yates et al., 2003), as well as lifestyle activity recommendations (Eylar et al.). Although the term physical activity is a broad concept that incorporates exercise and physical fitness, it is difficult to compare results across studies, other than in a broad sense, when definitions vary so widely. Moreover, given the limited number of older women participating in vigorous physical activities, consideration should be given to the validity and representativeness of the physical activity definitions and measures chosen to assess this population. Interpretation and synthesis of these study findings is hampered by these persistent measurement limitations.

Operational definitions include objective measures such as treadmill exercise testing and metabolic measures of physical fitness (Hollenberg et al., 2003), total work capacity (TWC) and level of oxygen consumption at peak exercise (VO2peak) (Marchionni et al., 2000), and corroboration of reported aerobics class attendance (Resnick et al. 2000). Multiple self report instruments were used including two instruments, the Physical Activity Questionnaire 7 day recall (Mo-Kyung et al., 2003) and the Human Activity Profile (Yates et al., 2003), which were converted into metabolic equivalent (MET) levels, providing an estimate of physical activity intensity. Additional instruments included questions based on the CDC/ ACSM physical activity guidelines for lifestyle activity (Eylar et al., 2003), the Exercise Subscale of the Health Promoting Lifestyles questionnaire (Conn, Burks et al., 2003), and the 2001 Behavioral Risk Factor Surveillance System (BRFSS) survey, in which light activity was classified as inactive (Ainsworth et al., 2003). The conversion of self-report measures to MET levels represents an attempt to provide a more standardized measure of physical activity, although self-report lacks objectivity. None of the studies combined objective and subjective measures of physical activity. Researchers note there is an urgent need for

consistency in the measurement of physical activity behavior so that findings will be more comparable between studies (Marcus et al., 2000). Duration and frequency are usually incorporated in definitions of physical activity. However, with the exception of the study by Hollenberg and colleagues (2003), and the studies in which MET levels were calculated from self-report instruments (Mo-Kyung, et al.; Yates et al.), intensity is not included in definitions of physical activity.

In summary, this group of non-experimental studies provides important information about the contextual biological factors of age, health status, and emotional distress and their influence on physical activity behaviors, although findings are often difficult to compare across studies. However, the studies have not gone beyond examining the predictive ability of these factors to begin studying how these factors interact with behavioral change processes to determine behavioral outcomes. Thus, this proposed study could add to existing knowledge by describing the patterning of biological contextual factors with change processes to characterize and better understand women's health behavior change.

Environmental and Social Factors

Socio-economic status. Low socioeconomic status of a woman or her husband has been identified as a risk factor for the incidence and progression of CHD, with the social gradient for CHD mortality stronger for women than men (Brezinka & Kittel, 1996). Low SES appears to function as a significant source of stress for women with diagnosed CHD. These women often lack the financial resources to cope with the requirements of everyday life, much less the financial burdens imposed by a chronic illness. Older women, who are often widowed and living on a fixed income, and disadvantaged women may lack private health insurance and adequate financial resources to cope with a cardiac event and its sequelae

(Rankin, 1995). Furthermore, low SES may contribute to women's inability to follow prescribed medical and pharmacological treatment regimens, including lifestyle changes, (Young & Kahana, 1993), thereby worsening the progression and prognosis of the disease. Individuals who lack adequate psychosocial resources and attributes, and who have a disproportionate number of needs are more likely to appraise events, particularly a health event, as threatening and to experience a maladaptive stress response (Kline Leidy, Ozbolt, & Swain, 1990), resulting in psychosocial distress and dysfunction further exacerbating the disease process (Arnold, 1997).

Social comparisons. Research suggests that social factors such as social roles, social support and social isolation influence health behavior change through promoting or inhibiting change efforts (Chesney & Darbes, 1998; Fleury et al., 1997; Moser, 1994). Social comparison, the process of relating personal characteristics to the characteristics of others (Buunk, 1995) is another less well described social factor. Theory and research propose that individuals participate in social comparisons to obtain information, make self-evaluations, engage in self-enhancement (Taylor, Buunk, & Aspinwall, 1990), and make self-improvements (Helgeson & Taylor, 1993; Wood & Taylor, 1991). Chapter Six, the manuscript describing the results concerning social comparisons, provides a more in-depth literature review of the concept.

Behavior Change Processes

Self- knowledge

Self-efficacy. Research on the concept of self-efficacy, the belief in one's ability to undertake and accomplish a specific task, and to overcome barriers to accomplishing the task, has shown self-efficacy to be a potent aspect of self-knowledge. In two meta-analyses

of self-efficacy research (Gillis, 1993; Holden, 1991) the authors concluded that perceptions of self-efficacy consistently mediated behavior change and functioned as predictors of lifestyle change and maintenance. Self-efficacy has been shown to increase over time for women and men (Gardner, McConnell, Klinger, Herman, Hauck, & Laubach, 2003). During participation in a CR program, women's initial scores on a self-efficacy scale were lower than men's, but evidenced improvements comparable to, or greater, than improvements seen in men's scores (Carroll, 1995). Women who reported being very self-confident in their ability to exercise were up to five times more likely to be active or to meet physical activity recommendations than women reporting low self-confidence (Eylar, et al., 2003), with the personal correlate of exercise self-efficacy being most consistently and strongly associated with physical activity status. In a review of determinants of physical activity behavior, research indicated that, among the psychological correlates of physical activity, self-efficacy was the strongest and most consistent predictor of physical activity behaviors (Sherwood & Jeffery, 2000). Self-efficacy theory has provided the theoretical basis for lifestyle interventions directed at modifying risk factors for CHD. Furthermore, self-efficacy has been studied as a predictor of health behaviors related to lifestyle changes for secondary prevention of CHD, including increased physical activity and dietary modifications. However, self-efficacy has not been studied extensively in relation to lifestyle change behaviors in women with CHD. Chapter four offers an expanded and more in-depth review of the literature evaluating self-efficacy and physical activity in women.

Motivation Appraisal

Perceived barriers and benefits. Research suggests that regardless of gender, individuals fail to consider CHD to be related to lifestyle choices and personal risks, but rather tend to

relate it to stress or other aspects of the environment not within their control (Murray, Manktelow, & Clifford, 2000). Consequently, these beliefs affect decisions about CR attendance, the initiation and maintenance of a more physically active lifestyle, and compliance with prescribed regimens and other lifestyle changes (Cooper, et al., 1999; Missik, 1999; Murray, Manktelow, & Clifford; Oliver-McNeil & Artinian, 2002). When questioned about risk factors and the lifestyle changes prescribed for treating CHD, findings from two studies were similar. First time MI patients and their informal and formal caregivers participated in small groups to explore social and cultural influences on perceptions of CHD (Murray, Manktelow, & Clifford, 2000). The MI patients and their informal caregivers identified stress, not risky lifestyle behaviors, as the cause of CHD. Most of the patient sample was overweight, but none identified diet as a risk factor. However, when queried about needed lifestyle changes, participants identified the appropriate changes for their individual risk factors. Findings were similar in a survey of 33 women recently diagnosed with CHD (Oliver-McNeil & Artinian, 2002). Risk factors documented in the hospital chart were compared to a questionnaire of perceived risk factors. Documented risk factors differed from perceived risk factors. Stress was the most frequently listed perceived risk factor. These findings suggest that the limited awareness of personal risk factors may indicate that people with CHD are not ready or prepared to enact lifestyle changes to prevent further disease progression.

Age and gender combined with attitudes and beliefs may act in concert to influence women's adoption of a more physically active lifestyle. In a qualitative study conducted with women age 70 or older, women recognized the benefits of physical activity, but believed they were at risk for injury when participating in exercise (O'Brien Cousins, 2000). In the face of

this uncertainty, they reported medical reasons for not engaging in physical activity behaviors. Age was found to be the only demographic variable associated with behavioral change in a study of 266 seniors, ages 60 and older, recruited from senior centers (Courneya, 1999). The association between age and physical activity behaviors occurred through the beliefs held by subjects about exercise and its benefits. Older participants held less positive beliefs about physical activity behaviors, describing fewer benefits and more barriers. The discriminators that delineated those in the maintenance stage of behavior from those thinking about initiating a more physically active lifestyle included attitude towards exercise and perceived ability to overcome barriers. The relevance of perceived benefits and barriers was further supported in a study of 349 individuals following discharge from a Phase II CR program (Hellman, 1997). Perceived benefits and barriers to exercise predicted the stage of exercise adherence. Participants perceiving few benefits and many barriers were significantly more likely not to be considering starting an exercise program. Research suggests that beliefs function as predictors of the stage of exercise behavior.

Findings from focus groups conducted by Walcott-McQuigg and Prohaska (2001) with 103 older African-Americans further corroborate this relationship. Respondents who reported participating in a regular program of physical activity expressed more benefits from their activities and perceived fewer barriers, while individuals who reported not participating expressed self-efficacy for exercise, but not for overcoming perceived barriers to exercise.

Although women identified increasing their levels of physical activity as a priority for lifestyle change, they also identified numerous barriers to accomplishing this goal (Mosca, et al., 1998). Poor self-esteem was the main barrier to lifestyle change, followed by high levels of perceived stress and lack of money, knowledge, and skills. In a path analysis of older

women's exercise behaviors, findings indicated significant negative relationships between barriers to exercise and self-efficacy and exercise behaviors (Conn, Tripp-Reimer et al., 2003). Moreover, barriers mediated the associations between outcome expectancies and exercise behaviors, and health and exercise behaviors. In another study, women reported significantly less confidence in their abilities to overcome barriers to physical activity compared to men, and accumulated significantly lower exercise adherence rates while participating in a Phase II program of CR. (Blanchard et al., 2002). Identified barriers included fear of having a heart attack while exercising and experiencing anginal pain in the morning, while not being significant concerns for the men participating in the study.

Beliefs about heart disease and physical activity vary. Persons recovering from a first time MI expressed the belief they should participate in less physical activity because of having heart disease, rather than viewing increased physical activity as a risk-reducing behavior (Murray et al., 2000). Well, community-dwelling older women believed in the health benefits of exercise, but did not include CHD prevention as part of the health benefits (Conn, Tripp-Reimer, et al., 2003). The correlational results of this study indicated that women's beliefs about barriers predicted their exercise behaviors and their intention to exercise.

Readiness. The concept of readiness occurs in other theories in addition to the wellness motivation theory. Readiness is well described and occupies central importance in the transtheoretical model (Prochaska & DiClemente, 1983). Readiness is evaluated by determining the stage of behavioral change. The stages are precontemplation, contemplation, preparation, action, and maintenance. Precontemplation is characterized by the lack of plans to enact a behavioral change. Contemplation involves giving serious consideration to changing a behavior, but not engaging in behavioral change. The preparation stage

incorporates progression towards behavior change through initial attempts and planning. Action involves actual performance of a new or changed behavior, such as engaging in moderate physical activity for 30 minutes 5 times per week. The behavior enters the maintenance stage when the behavior is sustained for more than six months (Prochaska & DiClemente). Each stage of readiness indicates a different level of motivation. Motivation promotes the development of goal achievement strategies. As women recovered from a cardiac event and adjusted to a changed view of the self, they began to discover personal strengths that helped them identify relevant goals for health behavior change (Fleury et al., 2001). Goal identification led to an enhanced sense of readiness for initiating and sustaining the health behavior changes.

In a cohort of older women, having more completely developed goal strategies demonstrated a strong direct relationship to behavioral change and marked progression through the stages of change (Conn, Burks, et al., 2003). Findings from another study with older women revealed the major predictor of physical inactivity to be lack of commitment (Conn, Tripp-Reimer, et al., 2003). A lack of commitment implies a lack of motivation, goal setting, and readiness. Readiness predicted the initiation of exercise behavior in a cohort of older women participating in a clinical trial of exercise for osteoporosis prevention, and accounted for 45% of the variance combined with social support for exercise (Litt, Kleppinger, & Judge, 2002). Mexican-American women, interviewed about their physical activity behaviors, reported lower levels of self-efficacy during the early stages of readiness, while African- American women reported higher levels of self-efficacy with a higher stage of readiness (Walcott-McQuigg & Prohaska, 2001). This supports the proposition in social cognitive theory that self-efficacy increases with performance experience (Bandura, 1989).

Critique. Collectively, these studies provide compelling evidence that beliefs and attitudes about the self, heart disease, and physical activity function as both significant barriers to and markers of physical activity behavior change. However, methodological and theoretical issues exist in this group of studies.

Approximately two-thirds of the studies that examined aspects of motivation appraisal and physical activity behaviors provided a theoretical basis for the study and the concepts being studied. The theoretical bases for these studies include the theory of planned behavior (Conn, Tripp-Reimer, et al., 2003; Conn, Burks, et al., 2003; Courneya, 1999), the transtheoretical model (Conn, Burks, et al.; Courneya; Walcott, McQuigg & Prohaska 2001), stages of change (Litt et al., 2002; Cloutier-Laffery, 2000; Hellman, 1997), self-efficacy theory (Cloutier-Laffery), and social learning theory (Litt et al.). It is evident from the preceding list of theoretical support that studies commonly employ more than one theory, that concepts overlap between theories, and these theories are commonly used in studies of exercise behavior. Confusion may arise in attempting to understand the overlapping concepts, since they may have slightly different relationships to other variables within each theory, but the current state of the science indicates the use of several theories in a study is a common occurrence. Four studies did not detail a theoretical basis for the study, but rather provided empirical support (Blanchard et al., 2002; Mosca et al., 1998; Murray et al., 2000; Oliver-McNeil, 2002). Two studies collected data through focus group input (Murray et al.; Walcott-Mc-Quigg & Prohaska) and two through questionnaires (Mosca et al., 1998; Oliver-McNeil & Artinian, 2002).

Samples varied in size and composition. Sample sizes for quantitative studies ranged from a maximum of 349 (Hellman, 1997), to 200 or more participants (Conn, Burks et al, 2003;

Conn, Tripp-Reimer et al., 2003; Courneya, 1999; Mosca et al., 1998), between 71 and 189 participants (Blanchard et al., 2002; Cloutier Laffery, 2000; Litt et al., 2002; Walcott-McQuigg & Prohaska, 2001), and a minimum of 30 participants (Murray et al., 2000). Reports of the studies did not specify sample size determination or power analysis, making judgments of sample size adequacy complicated. Murray et al. (2000) recruited 24 first time MI patients, along with 10 of their informal caregivers, and 14 formal caregivers (nurses from the cardiac unit). Ten groups were formed, with each group composed of one cardiac patient, one informal caregiver, and one formal caregiver. This indicates that a large number of recruited subjects, 14 MI patients and 4 formal caregivers, did not participate in the groups. No explanation was provided regarding the disposition of the eligible, but not included, subjects, raising the concern of selection bias and calling into question the validity of the study.

Several studies recruited mixed samples and analyzed data by gender (Blanchard et al., 2002; Courneya, 1999; Mosca et al., 1998). However, Hellman (1997) provided no differential analysis by gender, limiting the applicability of the findings. The mixed samples included participants in formal programs of CR (Blanchard et al., Hellman, 1997), a multidisciplinary, preventive cardiac clinic (Mosca et al.), and older adults recruited from senior centers (Courneya). The clinical populations provide relevant data regarding lifestyle change processes undertaken to treat CHD, and findings are particularly salient for this proposed study. Walcott-McQuigg and Prohaska (2001) conducted focus groups with a mixed sample of older African-Americans and identified themes from the data, including gender-related issues. This study provides important information about older African-

Americans and physical activity behaviors, although subjects were recruited as a convenience sample, limiting external validity.

Samples composed solely of women included clinical (Litt et al., 2002; Oliver-McNeill & Artinian, 2002) and non-clinical populations (Cloutier Laffery, 2000; Conn, Burks et al, 2003; Conn, Tripp-Reimer et al., 2003). In the only study conducted with a clinical population of women newly diagnosed with CHD, the lack of significant findings may have resulted from the small sample size of 33 (Oliver-McNeil & Artinian). Comparisons between perceived CHD risk factors, obtained by questionnaire, and documented risk factors provided a description of differences. But when the data were subjected to analysis, no significant differences were discovered. The other population consisted of 189 women enrolled in a randomized clinical trial examining the effects of two exercise interventions on bone density (Litt et al., 2002). This sample was recruited through media advertising and consisted of well-educated, motivated, white women, most of whom reported exercising before study enrollment.

One study with a non-clinical population included seventy-one well, older Mexican-American women who provided information about their physical activity behaviors (Cloutier-Laffery, 2000).However, no information describing recruitment sites or strategies was provided. The other studies with non-clinical samples included two large convenience samples in the studies done by Conn and colleagues (Conn, Burks et al; Conn, Tripp-Reimer et al.). They consisted of community dwelling women over the age of 65, recruited through advertisements in the local media. In a mixed volunteer sample recruited from senior centers (Courneya, 1999), maintenance exercise behavior was reported at 55.9%, almost double the national estimate (Marcus et al., 2000), suggesting that the recruiting methods had resulted in

a special, highly motivated population. This observation is further supported when looking at the operational definition of exercise in this study, which did not include low level physical activity, measuring only moderate and vigorous level activities. The characteristics of highly motivated volunteers, such as those in several of the aforementioned studies, could lead to the measurement of behavioral artifacts resulting in systematic error (Morgan, 1997). The special nature of these volunteer samples limits the generalizability of the findings. Moreover, it suggests the possibility of selection bias (Campbell & Stanley, 1963).

Study designs were diverse, including qualitative methodology (Walcott-McQuigg & Prohaska, 2001), mixed methodology (Murray et al., 2000), and quantitative methodology. Cross-sectional, correlational designs dominate the group of studies (Blanchard et al., 2001; Cloutier Laffery, 2000; Conn, Burks et al, 2003; Conn, Tripp-Reimer et al., 2003; Hellman, 1997; Mosca et al., 1998; Oliver-McNeil & Artinian, 2002), which is surprising in light of the long-term nature of investigations conducted in the area of exercise behaviors. It would seem that the state of the science would be further advanced with more experimental work available to characterize the process. Two studies used a repeated measures design. In the study examining physical activity behaviors in 266 community-dwelling seniors, baseline data were obtained at study enrollment and additional questionnaires obtained two weeks later (Courneya, 1999). Although the intervals between data collection points, as well as the number of data collection points, are limited the design is preferable to single occasion measurement in an attempt to characterize a process (Brown & Moskowitz, 1998). More frequent measures better characterize the data reported in the study by Litt and colleagues (2002). Self-report measures were obtained at baseline and 12 months, while measurement of exercise maintenance occurred every 3 months. The study involved two interventions,

requiring more frequent data collection, thus providing a better understanding of process. However, the process being described is related to intervention effects and not a study of processes as they occur naturally and in context. Therefore, generalizability to the proposed sample for this study is limited.

Methodological issues characterize the measurement of study variables and collection of data. Physical activity is conceptually defined as exercise in most of the studies, although Courneya (1999) defined physical activity as any planned physical exertion aimed at improving or maintaining physical fitness and health. This definition appears similar to the definition usually associated with exercise. Moreover, no measures of low level activity were included, only moderate level activity. Although exercise provided a fairly consistent conceptual definition, the operational definitions vary widely. Operational definitions of exercise included self-reports, with none of the studies corroborating self-report with objective measures. None of these studies provided a measure of exercise intensity, as noted in previous studies that converted self-report measures to MET levels. One study objectively defined exercise as adherence to a program of cardiac rehabilitation (Blanchard et al., 2002). Adherence was quantified by dividing the number of sessions actually attended by the number of sessions prescribed.

Inconsistencies in defining exercise adherence are apparent. Adherence is defined by the number of Phase II CR sessions attended during the 12 week program (Blanchard et al., 2002), and as exercise behaviors following discharge from a Phase II CR program (Hellman, 1997). Clearly, the time parameters for these definitions of adherence differ and do not capture the same patterns. This results in confusion about what stage of behavior is being measured across studies. The definition of adherence offered by Courneya (1999) more

closely approximates the definition of initiation. Initiation occurs during the first six months of engaging in a new behavior, and at six months is followed by maintenance or adherence behavior.

Social psychological concepts were measured with theoretically congruent instruments across those studies providing a theoretical basis. Researchers provided reliability and validity data for all instruments, with the exception of the Process of Change instrument used to measure strategies for goal achievement (Conn, Burks, et al., 2003). Qualitative pilot work, guided by the theory of planned behavior, was used to develop an instrument to measure perceived control beliefs, beliefs about factors that can act to promote or inhibit behavior (Conn, Burks, et al.). Eight questions assessed this variable, but no psychometric data were described for the instrument's development or use in the study. Studies not based on theory provided adequate psychometric data, but the measures used were not supported by or developed through theory. Measures of social psychological concepts were obtained as paper and pencil measures with the exception of the study by Cloutier Laffery (2000). The author described having self-report instruments translated into Spanish, but after completing the study indicated the questions may not have been interpreted as expected. The researcher interviewing participants was described as being chosen for her "personal and warm" nature, which could result in participants providing socially desirable responses to please the interviewer.

These studies support the influence of perceived barriers and benefits on exercise behaviors, while more highly developed strategies for achieving physical activity goals predict the stage of motivational readiness. The studies are limited by methodological issues, but still provide convincing evidence. The cross-sectional nature of data collection allows no

assessment of the process of change or how factors may interact differently at different time points. The findings may have limited applicability to women recovering from CHD because of the few clinical populations and the special nature of the volunteer samples in these studies

Self-regulation. The concept of self-regulation will not be included in the proposed study model. Self-regulation is more strongly related to maintenance behaviors and is better assessed after six months of engaging in the behavior (Fleury, 1998).

Action

Risk modification and risk reduction. The final dimension of the model is action. Action incorporates risk reducing behaviors, and through the new behaviors a reduction in risk factors is realized. For example, an individual undertakes a program of regular physical activity to modify their risk factor of sedentary lifestyle. They accomplish this goal by incorporating short periods of moderate intensity (60% to 75% of maximal capacity) activity (approximately 5 to 10 minutes) that total 30 minutes on most days (Fletcher, Balady, Blair et al., 1996) on a regular basis for 3 months. As a result of this health behavior change the individual experiences a physiologic response as evidenced by improvements in measures of physical fitness, and changes in markers of physical activity (or inactivity) such as body mass index (BMI). Measuring the concepts involved in action benefits from the use of multiple measures to examine different levels of action related to behavioral change. Measures can include objective evaluations, subjective responses, and physiologic or biologic responses (Fleury et al., 1997).

In summary, empirical evidence from quantitative and qualitative research supports the role of the contextual factors of age, health status, emotional distress, SES, and social

comparison processes in relation to self-efficacy and health behavior change. Moreover, research supports the influences of self-efficacy and the importance of having goal strategies to facilitate readiness for health behavior change. These factors have predicted physical activity behaviors and demonstrated direct and indirect influences. Therefore, extant research supports the proposed model, based on the theory of wellness motivation, for studying women's initiation of physical activity behaviors following a cardiac event during CR attendance. Moreover, this research proposes to address the limitations represented in this diverse group of studies by providing consistent definitions of the concepts, evaluating process, and measuring variables prospectively and when appropriate with subjective and objective means. Therefore, this research is proposed to describe and explore the physical, psychosocial, and behavioral factors involved with initiating a more physically active lifestyle as they change over time during participation in a formal, Phase II program of CR.

Specific Aims and Research Questions

The aim of this study was to describe and explore, for women participating in a 12 week formal, Phase II CR program, intra-individual patterns of change in the processes of recovery, specifically in adopting increased levels of physical activity. The research questions are:

1) What are the typical patterns of change women experience in contextual influences, behavior change processes, and physical activity during the 12 weeks of CR participation?
2) How stable, or dynamic, over time are contextual influences, behavior change processes, and levels of physical activity?
3) How linear are individual trajectories of change over 12 weeks?

4) When subjects are grouped by levels of physical activity, do the groups differ in the temporal patterns of contextual influences or behavioral change processes? When subjects are grouped by high or low emotional distress, high or low subjective health status, high or low objective health status, high or low self-efficacy, high or low goal setting, and high or low barrier efficacy:

   a) Which groups adopt higher levels of physical activity?

   b) Do groups differ in their patterns of initiating increased physical activity?

5) What are the social comparison processes women engage in during the period of participation in a program of CR?

CHAPTER 3

RESEARCH DESIGN AND METHODS

A repeated-measures, longitudinal design was used to describe and explore, for women who have had a cardiac event, the contextual factors and behavioral change processes involved in the initiation and adoption of varying levels of physical activity while attending a formal, Phase II cardiac rehabilitation program. Women were recruited and enrolled during their initial contacts with the CR program. The variables chosen for exploration in this study were selected based on theory and empirical findings. Measures were obtained four times during the twelve weeks of participation in the cardiac rehabilitation program. Participants were assessed with measures of contextual factors, behavioral change processes, risk modification behaviors, and risk reduction outcomes at baseline (program entry), four weeks, eight weeks, and twelve weeks. Participation in a formal Phase II CR program is associated with many opportunities for learning mastery through repeat performance, vicarious experience, and verbal persuasion, which all effect perceived self-efficacy (Bandura, 1986). Therefore, self-efficacy, social comparison processes, and risk reducing behaviors should evidence change over the 12 week period. Measurement of process requires repeated measurement of the associated concepts (Brown & Moskowitz, 1998). Change may be captured with measures at baseline and program discharge, but offer no description of the process as it occurs between those time points. In designing a study, considerations must also include respondent burden, so multiple measures between baseline and discharge may not be practical or reasonable. Therefore, the decision regarding the number and time points for

measuring variables requires some understanding of the temporal variations that can be expected of the variables.

Much of the research undertaken to better understand motivation and the appraisal of readiness to enact behavioral change has been designed using single occasion measurement (Blanchard et al., 2002; Cloutier Laffery, 2000; Conn, Tripp-Reimer, & Maas, 2003; Conn, Burks et al. 2003; Hellman, 1997; Mosca et al., 1997; Oliver-McNeil & Artinian, 2002). This provides scant understanding of the temporal progression of behavioral change and little information on which to base decisions about the timing of data collection.

Emotional distress has been better characterized through repeated measures, longitudinal research. However, few studies have included time points associated with the period of participation in CR. The time associated with CR, incorporating the variable entry times, approximates weeks three through twenty-four post cardiac event. Therefore, studies that evaluated emotional distress up to six months after a cardiac event have been included. In patients who underwent CABG, King, Porter, and Rowe (1990) measured mood disturbance at 1, 4-6, and 12 months after discharge. Positive mood increased from the first month to the second measurement point at 4-6 months, then remained stable. Rankin (1990) measured mood disturbance at one and three months after discharge, and Cronin, Logsdon, and Miracle (1990) measured depression and anxiety, but both results indicated mood disturbance was low at both time points evidencing little change. Mood disturbance, depression, and anxiety were assessed at one and four months post-MI, with measures of all showing improvement over time (Riegel & Gocka, 1995). Rose, Suls, Green, Lounsbury, and Gordon (1996) measured emotional distress at 4, 10, 16, and 22 weeks post-MI, but did not provide mean scores for the time points, limiting interpretation. These findings suggest the need for better

description of the changes in emotional distress while recovering from a cardiac event and while participating in a program of CR.

The concept of self-efficacy has been widely researched and provides a better template for data collection. In two reports of the same study (Gillis et al. 1993; Gortner & Jenkins, 1990) the researchers measured self-efficacy at 4, 8, 12, and 24 weeks following cardiac surgery and participation in a telephone-based intervention to enhance self-efficacy for physical activity. Study findings indicated self-efficacy was very dynamic between weeks 4 and 12 with a ceiling effect between weeks 12 and 24. The reports do not note if the subjects participated in CR in addition to the special intervention, and the special intervention was completed by week four. Therefore, changes in self-efficacy cannot be assumed when there is no opportunity or mechanism for performance experience or learning.

Foster, Oldridge and colleagues (1995) noted that surprisingly little information exists regarding the magnitude and time course of specific aspects of recovery post cardiac event. Twenty-six patients (19 men and 7 women) with early entry (16.6 $\pm$ 12.4 days post clinical event) into a Phase II CR program were followed at baseline, 4, 8, and 12 weeks following program entry with measures of exercise tolerance, self-efficacy for exercise, and health-related quality of life. Recovery was defined as 85% of the age/gender predicted power output and 85% of possible self-efficacy and QOL scores. All measures increased significantly ($P<.05$) over the course of the program. Exercise tolerance was achieved at 21 weeks post-program entry, while self-efficacy scores steadily increased from baseline to program discharge, suggesting that self-efficacy remains fluid and changeable throughout CR. The dynamic nature of self-efficacy during CR participation is congruent with Bandura's (1986) conjecture that self-efficacy changes with performance of a skill as the individual

moves towards mastery of the skill. Given these findings, data collection was conducted at four time points in the twelve weeks of CR participation, at baseline, and at four and eight weeks, and at the twelve week program completion. In addition, open-ended interviews were conducted with a sub-sample of the participants to provide a more detailed description of social comparison processes and outcome expectancies as they occur during rehabilitation.

Setting

After receiving Institutional Review Board (IRB) approval, 20 female subjects were recruited. Two recruitment sites were identified, the UNC Hospitals Cardiac Rehabilitation program (UNCH-CR) and the Duke Center for Living Cardiac Rehabilitation program (DCL-CR).

The UNCH-CR is a part of the UNC Health Care system, located in the Wellness Center at Meadowmont. The UNCH-CR multidisciplinary team offers a comprehensive program for prevention and rehabilitation of heart disease, including; cardiovascular evaluation, supervised exercise, stress management, nutrition counseling, heart disease education, vocational rehabilitation, and smoking cessation.

The UNCH-CR program serves a multi-county area, receiving referrals from numerous physicians and facilities (Marti, personal communication, May 27, 2004). Since the program staff only recently developed a database, to keep demographic and other data on participants (Rodriguez, personal communication, May 27, 2004), estimates, rather than actual totals, for the participants' profile are provided. Annual attendance in the year old facility totals approximately 300 patients with 75 to 90 patients being women (25% - 30%). Patients participating had a variety of diagnoses including MI (30%), CABG (35%), PTCA (5%), valve surgeries (5%), and congestive heart failure (5%) (Marti, personal communication,

May 27, 2004). The staff were unable to provide estimates of ethnic distribution, but reported that the majority of attendees were white (Rodriguez, personal communication, May 27, 2004).

The UNCH-CR program facilitates recovery following a cardiac event by helping the patient regain a sense of independence and confidence in physical capabilities. Most patients enrolled in the rehabilitation program have diagnosed CHD and participate following hospitalization for an MI, angina, CABG, or PTCA. Providing early intervention within the first 3 weeks to 3 months following a cardiac event is preferred, but beginning participation may be delayed as long as 1 year due to issues with arranging Medicare coverage for services (Miller, personal communication, , May 17, 2004).

When UNCH-CR receives a physician referral a patient contact is initiated via telephone by the patient care coordinator. The coordinator provides a brief explanation of the program and schedules an appointment for the patient to tour the facility (Marti, personal communication, May 27, 2004). The patient receives information about the program and a tour. All questions are answered. The patient is introduced to members of the CR team and observes people participating in planned exercise. Program personnel encourage participation and stress the benefits of participation. If the patient agrees additional appointments are scheduled.

Before exercise begins the patient undergoes several days of evaluation that include a cardiac stress test, assessment of exercise tolerance and fitness, nursing assessment, and blood work to identify specific risk factors and needs. Based on the evaluation, an exercise physiologist develops an individualized exercise prescription. In addition to the clinical evaluation, participants complete a detailed questionnaire to determine diet composition. All evaluations and measures are obtained at program entry and again in 12 weeks at program

conclusion. Any information obtained from the questionnaires suggesting the need for education or consultation result in a referral to the appropriate provider.

The exercise program begins with two days of monitored exercise under direct medical supervision then progresses through the 12 week program to unsupervised exercise. Individuals enter CR in a rolling enrollment. Participants do not begin and end the program as a specific group, but participants do exercise at the same scheduled times throughout the 12 week program, providing an informal group. Rehabilitation classes take place on Monday, Wednesday, and Friday in 90 minute sessions from 7 am to 8:30 am, 8:30 am to 10 am, and 10 am to 11:30 am. The 90 minute session includes 15 minutes for arrival and taking and recording heart rate (HR) and blood pressure (BP), 15 minutes for warm-up, 30 minutes for exercise, 15 minutes for cool-down, and 15 minutes to take and record HR and BP. Each participant records their pre and post HR and BP in a personal log. Classes in nutrition, stress management, smoking cessation, and heart disease awareness are scheduled regularly and attendance is encouraged but not mandatory.

The DCL-CR is a part of the Duke Health Care system, located in the Duke Center for Living (DCL-CR) in Durham. The DCL-CR is a 27 year old program that provides strategies for prevention and rehabilitation of heart disease. This includes cardiovascular evaluation, supervised exercise, stress management, nutrition counseling, heart disease education, vocational rehabilitation, and smoking cessation.

The DCL-CR has a similar program to the UNCH-CR in which there is rolling enrollment for a 12 week program. Enrollment varies week to week, with women participants totaling about 120, or approximately 45% of the annual enrollment (Craig, personal communication, May 28, 2004).

The DCL-CR receives referrals for patients with approximately 80% having experienced an MI or CABG, and the other 20% have a diagnosis of PTCA or angina. The DCL-CR serves patients mainly from urban and rural Durham County, with fewer participants from Orange, Alamance, and Wake counties. The majority of participants represent white, middle class America with ages ranging from 60 to 75 years of age (Craig, personal communication, July 12, 2004). Patients are referred to the DCL-CR by their personal physician following a cardiac event and usually begin the exercise program at six weeks post event (Craig, personal communication, July 12, 2004). The program does not promote early enrollment and has had little difficulty in receiving insurance approval for patients requiring a delay in their start date. Patients are contacted by staff and provided an information packet about the program and asked to complete some questionnaires before beginning.

All CR participants complete a general measure of physical and psychological status, a cardiac disease knowledge tool, and a nutrition information sheet. Additionally, participants complete a monitored GXT at program entry and completion (Craig, personal communication, July 12, 2004). The program consists of 90 minutes of exercise 3 days per week with additional classes on stress management, nutrition, and smoking cessation available immediately before or after the scheduled exercise sessions. Attendance at these classes is strongly suggested and encouraged, with convenient times and topical subjects (Craig, personal communication, July 12, 2004).

The program begins with two days of monitored exercise then progresses through the 12 week program to unsupervised exercise. Exercise classes take place on Monday, Wednesday, and Friday. The scheduled times are 8 am to 10:15 am and 9:30 am to 11:45 am (Craig, personal communication, July 12, 2004). 90 minutes of exercise are followed by or preceded

by a 45 minute lecture. The 90 minute exercise session is divided into 45 minutes of aerobic exercise and 45 minutes of strength training, and is preceded by a 15 minute warm-up and followed by a 15 minute cool-down. Blood pressure is not monitored or recorded by participants as in the UNCH-CR program.

Sample

The study sample included 20 women enrolled in a formal, Phase II CR program after experiencing a cardiac event defined as an MI, CABG, or PTCA, or receiving a diagnosis of stable angina. Additional criteria included being newly enrolled in the CR program, able to speak and read English, able to hear and respond to questions, able to give informed consent, and able to follow instructions over the four data collection points. Newly enrolled means the woman had participated in fewer than five exercise sessions within the first two weeks of enrolling, and had never been enrolled previously in a program of CR.

Participants are classified according to cardiovascular risk on the Heart Path® Risk Stratification for Patients Entering Cardiac Rehabilitation. This assessment tool is based on recommendations from the American College of Cardiology (ACC), American College of Physicians (ACP), AHA, American College of Sports Medicine (ACSM), and the American Association of Cardiovascular & Pulmonary Rehabilitation (AACVPR). Clinical symptoms associated with high risk categories may preclude engaging in regular physical activity despite individual motivation (Haskell, 1994). Therefore, individuals were excluded if they: were unable to participate in the standard rehabilitation protocol; had nonvascular cardiac surgery such as a valve replacement; had attended CR; were unable to follow instructions; or had plans to leave before completing the 12 week program. Patients with a history of major depression, anxiety disorder, or other major psychiatric diagnoses were evaluated on a case

by case basis for the capacity to participate. Evaluation was based on the assessment made by the staff psychologist. Age is a biologic variable of interest in the wellness motivation model; therefore no limitations were placed on subject age. Efforts were made to recruit women of diverse ethnic and cultural backgrounds, although the predominant patient population is not diverse.

The calculation of sample size using a power analysis is not appropriate for a descriptive study, but the measurement of 20 participants at 4 time points results in a total of 80 data points which provides adequate power for evaluating patterns (Belyea, personal communication, June 29, 2004).

Variables and Measures

The variables chosen for exploration in this study were selected based on theory and empirical findings. All self-report measures were printed in a 12 font to facilitate reading the instruments since most participants are likely to be 60 to 65 years of age or older. The age range of women participating in the UNCH-CR program is 60 to 80 years, and in the DCL-CR ages range from 60 to 75 years.

Contextual Variables

Age

Age was assessed in calendar years. Participants were asked to provide their chronological age as of their last birthday (see Appendix, Demographic Data).

Self-reported health status

Health status was assessed with several measures including the Duke Activity Status Index (DASI) (see Appendix, Duke Activity Status Index), self-reported comorbidities (see Appendix, Demographic Data), and the Graded Exercise Test (GXT).

The DASI measures health status by assessing self-reported functional capacity through use of a 12-item questionnaire format (Hlatky, Boineau, Higginbotham et al., 1989). Responses are weighted based on the known cost of each activity in MET units with scores ranging from 0 (worst) to 58 (best). The DASI provides an accurate measure of functional capacity and an assessment of aspects of quality of life (Hlatky, Boineau, et al., 1989). Fifty subjects underwent exercise testing with measurement of peak oxygen uptake. All subjects answered questions about their ability to perform a variety of common activities. Interviewers were blinded to exercise test findings. A 12-item scale (the DASI), that correlated well with peak oxygen uptake (Spearman correlation coefficient 0.80), was developed. An independent group of 50 subjects completed a self-administered questionnaire to determine functional capacity and underwent exercise testing with measurement of peak oxygen uptake. The DASI correlated significantly ($p < 0.0001$) with peak oxygen uptake (Spearman correlation coefficient 0.58) in this independent sample.

Clinically meaningful changes are captured by differences of two or more units on the DASI (Hlatky, Boothroyd, Vittinghoff, Charp, & Wholley, 2002), and the DASI has demonstrated sensitivity to clinical changes in patients with CHD (Alonso, Permanyer-Miralda, Casant, Brotons, Prieto, & Soler-Soler, 1997). Functional capacity was measured in 476 women with CHD using the DASI and other related instruments establishing concurrent criterion-related validity for the instrument. Moreover, the DASI was a significant independent predictor of functional capacity, even after controlling for cardiac risk factors (Bairey-Merz, Olson, McGorray et al., 2000). Thus, these findings provide predictive criterion-related validity for the DASI.

Rankin (2002) compared the recovery trajectories of African American and white women recovering from acute MI and used the DASI as a measure of cardiac functional status. African American women reported poorer cardiac functional status at all time points, with the scores on the DASI 50% lower than the white participants. Internal consistency of the DASI was assessed by Cronbach's α and ranged from 0.80 to 0.88. The DASI provided a measure of functional status, and then baseline scores were used to predict CR participation (Harlan, Sandler, Lee, Lam, & Mark, 1995). Non-participants demonstrated significantly more functional impairment compared to participants (p= 0.001).

The DASI offers brevity and ease of administration, and can usually be completed in about five minutes. Because this study collected data longitudinally with frequent data collection points, it was imperative to minimize the perceived participant burden. Thus, the DASI was used in this study as a measure of self-reported health status.

Objective health status

The GXT was used to assess objective health status at baseline (T1) and risk reduction at discharge (T4) An individual participant's performances on the GXT provide a diagnostic and a functional assessment of cardiopulmonary fitness (White & Evans, 2001).The test is performed at baseline and at discharge from the UNCH-CR rehabilitation program to provide an objective indicator of health status. The GXT was obtained by the staff as part of the entry and discharge protocol at UNCH-CR. In the DCL-CR programs the GXT was obtained approximately half way through program membership for most of the participants.

The GXT, sometimes referred to as the Bruce protocol, was developed to assess exercise tolerance, and has become a standard tool in CR for assessing CHD risks and improvement (Tallaj, Sanderson, Breland, Adams, Schumann & Bittner, 2001). The GXT has also proven

useful in assessing physical fitness, determining functional capacity, diagnosing ischemic heart disease, defining the prognosis of ischemic heart disease, developing an exercise prescription, and guiding cardiac rehabilitation (Williams, 2001). Peak oxygen consumption is calculated based on performance on the GXT and converted to METs.

The GXT has been widely used in many samples of CR participants. Performance changes on the GXT have been used as an outcome measure to assess the effectiveness of exercise interventions (Hevey, Brown, Cahill, Newton, Kierns & Morgan, 2003; Yu, Li, Lam, Siu, Miu, Lau, 2004), and as a measure of concurrent criterion-related validity with the six minute walk test (Hamilton & Haennel, 2000; Tallaj et al., 2001). Moreover, the GXT has demonstrated significant ability to predict future cardiac events (Kavanagh, Mertens, Hamm, et al., 2003). Thus, the GXT provides an available and objective measure of health status that has demonstrated reliability and validity and provides assessment of concurrent criterion-related validity.

Emotional distress

The Profile of Mood States Short Form (POMS-SF) (see Appendix, POM-SF) was used as a measure of emotional distress (Shacham, 1983). The POMS-SF is a 30-item self-report instrument with 6 subscales to assess the mood disturbances of anger-hostility, tension-anxiety, depression-dejection, vigor-activity, fatigue-inertia, and confusion-bewilderment. Respondents rate words associated with the mood states on a 5-point Likert-type scale with choices ranging from “not at all” (0) to “extremely” (4). Higher scores are associated with greater emotional distress. A total score is obtained by summing five of the subscales and subtracting the vigor subscale. The POMS-SF also may be scored as individual subscales. The POMS-SF requires approximately five to ten minutes to complete.

The psychometric properties of the POMS-SF were evaluated with a sample of 600 adults representing five clinical samples and one sample of healthy adults (Curran, Andrykowski, & Studts, 1995). Internal consistency estimates for the POMS-SF were found to be comparable to those of the original POMS across all the samples. Moreover, correlations between total mood disturbance and the short form subscale scores and the subscales from the original form met or exceeded 0.95.

The POMS has been used extensively in studies with cancer patients, but less frequently with CHD populations, although the scales have demonstrated internal consistency with CHD populations. Earlier reported reliabilities were low for the anxiety (0.70) and depression (0.74) subscales of the POMS long form for individuals after MI (Webster & Christman, 1988). However, internal consistency was 0.97 when the POMS long form was used to measure emotional distress in a combined cohort of men and women CHD patients (Riegel & Gocka, 1995).

In a study comparing white women and African American women during the first year of recovery following a cardiac event no group differences were found between the groups for psychological distress (Rankin, 2002). Additionally, mood disturbance decreased for all participants over time. The POMS-SF measured psychological distress, demonstrating Cronbach's α internal consistency estimates ranging from 0.67 to 0.93 for repeated measures. Similar reliability was reported in a mixed sample of cardiac surgery patients participating in an intervention, ranging from 0.70 to 0.93 for repeated administrations (Gillis et al., 1993). No significant differences in POMS scores existed between the intervention and control groups, although all participants demonstrated significant increases in global mood state and vigor, as well as decreases in fatigue and tension scores over time. The POMS-SF, as a

measure of mood state, demonstrated an internal consistency reliability coefficient of 0.94, but failed to predict women's exercise maintenance after CR (Moore, Dolansky, Ruland, Pashkow, & Blackburn, 2003). Although CHD patients were not being evaluated, the vigor and fatigue subscales of the POMS measured health outcomes associated with psychosocial and environmental influences in a sample of 298 sedentary women (Nies & Kershaw, 2003). Internal consistency estimates were reported as 0.86 for vigor and 0.89 for fatigue. The POMS-SF represents a reliable instrument for assessing general symptoms of emotional distress while being able to track changes in the levels of emotional distress as the levels vary over time.

Socioeconomic status

Socioeconomic status (SES) was assessed by asking about financial, educational, occupational, and partnered status (see Appendix, Demographic Data). Financial status data was recorded as annual household income in $5000.00 increments. Past and present occupations were collected as open-ended questions, and used as descriptive data to characterize the sample. Education was recorded as the highest number of years of completed schooling. In addition to partnered status, the demographic questionnaire inquired about the number of household residents and dependents.

Social comparisons

The Social Comparisons Scale (Heidrich & Ryff, 1993b) was used to measure social comparisons, the cognitive process of comparing the self to others (see Appendix, Social Comparison Scale). The Social Comparisons Scale (Heidrich & Ryff, 1993b) was used to measure social comparisons, the cognitive process of comparing the self to others. Heidrich and Ryff (1993b) developed and tested an instrument for measuring the frequency of

engaging in social comparisons and the subjective outcomes of making the comparisons across various life domains in samples of older, community dwelling women. The internal consistency alpha coefficients for the frequency and outcome scales were 0.87 and 0.95 respectively. In a study of the revised Social Comparisons Scale, 243 older, community dwelling women completed measures of physical health and psychological well-being along with the social comparison measure. The internal consistency coefficients were 0.91 for the upward frequency scale, 0.92 for the downward comparison scale, and 0.94 for the consequences scale.

The current form of the instrument consists of 12 questions about circumstances in which social comparisons might be salient. Each question consists of 4 parts, asking the respondent to rate the frequency and the consequences of making upward comparisons and downward comparisons. The 12 questions inquire about social comparisons in the dimensions of aging, physical health, problem solving, dealing with life changes, managing health issues, life satisfaction, learning new things, physical appearance, feelings and emotions, being active, and the quality of relationships with family and friends. Development of the instrument took place with older, community dwelling women who had health issues, but were not coping with an immediate health threat and the need to change lifestyle behaviors. Consequently, some of the questions on the social comparisons scale lacked relevance for the purposes of this study. Therefore, the number of questions was reduced to six questions that address the domains of physical health, problem solving, dealing with life changes, managing health issues, feelings and emotions, and being active.

Behavior Change Processes

Self knowledge

Self-efficacy. Self-efficacy for walking and general activities was measured with the Jenkins Self-Efficacy Expectation Scales. These are a series of independent scales designed for the purpose of making the concept of self-efficacy expectation measurable across a group of behaviors relevant to recovery from a cardiac event (Jenkins, 1989). Instrument development was guided by self-efficacy theory. The scales were developed originally as part of Jenkins' dissertation research in 1985. The range of activities was designed for consistency with activities relevant in the process of recovery from myocardial infarction and for the time period of up to four weeks past discharge. In accord with the changes in prescribed treatment and activity protocols post cardiac event, the walking scale was revised and extended to encompass activity levels relevant up to six months after cardiac event. These revisions for walking behaviors make the scale a valid measure for individuals recovering from cardiac surgery and also for those participating in a Phase II CR program. The scales may be administered as paper and pencil measures, but can also be used in an interview format if desired. Each behavior scale is independent.

Scale development involved describing activities associated with the behavior, followed by developing a confidence rating scale. Each behavior was described by a sample of related activities of varying degrees of difficulty. Related activities for psychomotor behaviors such as walking were arranged in the hierarchical order of increasing difficulty. A confidence scale is displayed next to each activity, with numbers ranging from 0, to indicate "no confidence," to 10, to indicate "total confidence." Scoring is accomplished by summing the numerical responses and dividing by the number of activities on the scale. The resulting

score represents the strength, or level, of confidence the individual possesses in relation to the behavior. Higher scores indicate more strength or conviction in the ability to achieve a certain behavior. The strength score is the most widely used. Responses reported as "not applicable" are not included in scoring.

The scale for walking contains 15 questions that measure the perceived level of confidence for walking various distances (see Appendix, Jenkins Self-Efficacy Expectation Scale for Walking). The walking activities range from a minimum distance of walking from bed to bathroom to a maximum of walking 30 blocks, or 3 miles. The general activities scale contains 17 items that assess perceived level of confidence to accomplish tasks as fundamental as brushing teeth to as complex and demanding as resuming previous activities (see Appendix, Jenkins Self-Efficacy Expectation Scale for General Activities). Each scale is a measure of the confidence the individual feels for performing a specific behavior at the very moment of assessment.

Nursing studies frequently use the Jenkins Self-Efficacy Expectation Scales to measure confidence for walking and general activities behaviors. In studies with samples of CHD patients, estimates of internal consistency of the 2 scales ranged from 0.70 to 0.99 with data collection varying from one (Jenkins & Gortner, 1998), to two (Parent & Fortin, 2000), four (Carroll, 1995; Robertson & Keller, 1992), and six (Gortner & Jenkins, 1990) time points. Resnick and Jenkins (2000) determined validity for the self-efficacy measure by administering the instrument along with other psychosocial measures to 187 older adults residing in a continuous care home. Validity of the measure was based on hypothesis testing in which mental and physical health scores on the SF-12, an instrument to measure self-reported health status, predicted efficacy expectations, and efficacy expectations predicted

exercise activity. Accruing evidence supports the reliability and validity of the scales, especially with a CHD population.

The Jenkins Activity Check-List for walking and general activities was developed to complement the Jenkins Self-Efficacy Expectation Scales for walking and general activities (Jenkins, 1989) and to corroborate the Self-Efficacy Scale (see Appendix, Jenkins Activity Check-List for Walking and for General Activities). The Jenkins Activity Check-Lists are a series of independent lists designed to assess self-reported performance of a specific activity exactly as it appears on the Self-Efficacy scale. The Check-Lists are to be administered after the Self-Efficacy Scales, and are only to be applied to the activities of the previous 24-hour period. The Check-Lists may be used in an interview or questionnaire format.

The graded activities for each scale are listed with three columns appearing to the right with response choices of “not applicable,” “yes,” and “no” for questions that ask the respondent about the occurrence of a specific behavior. For example, the self-efficacy scale asks the respondent to rate the level of confidence in their ability to walk 10 blocks (1 mile), while the activity check-list asks whether the actual behavior has been performed in the last 24 hours. In keeping with theory, performance of a behavior should result in enhanced self-efficacy for performing that behavior (Bandura, 1986). The number of "yes" responses is summed for each scale. Higher total activity scores indicate a higher level of reported physical activity. Reliability and validity data for the Activity Check-Lists are reported with the Self-Efficacy Expectation Scales, since they were designed to be administered concurrently.

Motivation Appraisal

Readiness. Readiness was assessed with the Goal Setting Scale developed by Nies, Hepworth, Wallston, and Kershaw (2001) to measure behavioral change in sedentary women (see Appendix, Goal Setting Scale). The purpose was to gain insight into the development of more effective programs for promoting physical activity. Items were generated by a panel of content and measurement experts based on three constructs identified in behavioral change research as key determinants in the process. Thus, goal setting, restructuring plans, and relapse prevention and maintenance provided an a priori basis for scale development. Items were developed for each construct and resulted in a 16-item instrument, with 6 items for goal setting, 4 for restructuring plans, and 6 items tapping relapse prevention and maintenance. Respondents are asked to rate the items on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree".

The 16-item instrument was administered at three time points, baseline, six months, and 12 months, to 150 volunteers meeting the criteria of sedentary behavior. The 16 items were subjected to initial analysis resulting in 1 item being dropped. Analyses revealed a three factor model with adequate factor loadings on all scales but the restructuring plans scale (Nies et al., 2001). Results indicated the instrument had three distinct, but related, factors, and the scales could be used independently. Internal consistency reliability was assessed at baseline, 6 months, and 12 months. The goal setting scale demonstrated adequate internal consistency at baseline (0.70), 6 months (0.74), and 12 months (0.78). Test-retest reliability showed $r = 0.75$ comparing 0 to 6 months, $r = 0.69$ comparing 0 to 12 months, and $r = 0.76$ comparing 6 and 12 months. The restructuring plans scale evidenced poor internal consistency at all three time points (0.49, 0.50, & 0.60, respectively), while the relapse

prevention and maintenance scales showed adequate internal consistency reliability (0.71, 0.79, 0.78).

Further support for the goal setting and relapse prevention and maintenance scales was provided in a study to develop a model of psychosocial and environmental influences on the physical activity behaviors and health outcomes of sedentary women (Nies & Kershaw, 2002). Internal consistency reliability coefficients were estimated at 0.71 for goal setting and 0.71 for relapse prevention and maintenance.

Only the six questions comprising the goal setting scale were used as it demonstrates consistent reliability and validity, and the developer has stated that the scales may be used independently without compromising the psychometrics of the instrument (Nies et al., 2001). The psychometric properties of the restructuring plans scale are not adequate for use and the construct of relapse prevention and maintenance occurs later in the process of behavior change than the time period described in this study.

Readiness also was measured with the Barriers Self-Efficacy Scale, a scale designed to address barriers specific self-efficacy with a population of middle-aged adults (McAuley, 1992) (see Appendix, Barriers Self-Efficacy Scale). The Barriers Self-Efficacy Scale taps subjects' perceived capabilities to exercise in the face of commonly identified barriers to participation. The scale is composed of 13-items on which participants indicate their degree of confidence for overcoming each barrier on a 0% (no confidence at all) to 100% (complete confidence) scale. The confidence scores are summed and divided by the total number of items giving a possible range of 0-100%.

In a study with 174 older, sedentary adults the instrument demonstrated high internal consistency ($\alpha = 0.92$) (McAuley, Jerome, Elavsky, Marquez, & Ramsey, 2003; McAuley,

Jerome, Marquez, Elavsky, & Blissmer, 2003). Barrier efficacy was high at the initiation of an exercise program, but declined between three and six months, reaching the lowest point at six months when participants were facing exercising on their own (McAuley, Jerome, Elavsky et al.). A later follow-up at 18 months with the same group of adults revealed that barrier efficacy continued to contribute to perceived self-efficacy.

Action Variables

Risk Modification

Objective physical activity. The Yamax NL-2000 Activity Monitor provided an assessment of objective physical activity. It supplies an estimate of the number of steps walked, the distance walked, the number of total calories expended, and the number of calories burned through activity. The NL-2000 stores step totals and activity calorie totals for seven days. The internal clock resets totals daily resulting in no need for the study participant to use the reset button every day. Results of empirical studies with Yamax pedometers include models other than the NL-2000. These studies are included because all Yamax pedometers are designed using the same internal mechanism. Motion is sensed with a pivot-armature motion detector, coil spring tension for the lever arm, brass counterweights and rubber-sheathed conductive posts to prevent corrosion, a copper ground plane to inhibit electrical interference, and a screw lock to maintain the sensitivity setting. The usual battery life approximates two to three years.

Multiple studies provide support for the use of a Yamax pedometer in physical activity research. In describing convergent validity, Tudor-Locke, Williams, Reis, and Pluto (2002) pooled multiple studies that compared pedometers with physical activity self-report measures, accelerometers, observations, and energy expenditure estimates. They concluded that pedometers correlated strongly with accelerometers and observations, but less well with

self-reports and marginally with estimates of energy expenditures. A comparison of 10 electronic pedometers, including the Yamax NL-2000, revealed that electronic pedometers accurately assessed steps, less accurately assessed distance, and did an even less accurate job assessing kilocalories (Crouter, Schneider, Karabulut, & Bassett, 2003). Although some pedometers performed more poorly at slower walking speeds, the NL-2000 demonstrated acceptable accuracy at slower speeds (Crouter et al.). Further evidence of convergent validity was demonstrated in a study comparing three electronic pedometers, including a Yamax model, with an accelerometer (Le Masurier, Lee, & Tudor-Locke, 2004). The authors concluded that the Yamax model was the most consistently accurate pedometer under controlled and free-living conditions.

Bassett, Cureton, and Ainsworth (1999) conducted a study that provides concurrent criterion-related validity for the pedometer. Ninety-six individuals completed a physical activity index computed from the College Alumnus questionnaire and summed as energy expenditure for a variety of activities including walking. Data on walking distances were compared with values obtained from the Yamax pedometer. Findings indicated that participants underestimated the distance they walked when compared to the distance recorded by the electronic pedometer. Le Masurier and Tudor-Locke (2003) compared a Yamax pedometer with an accelerometer concluding that the pedometer performed well at counting steps at a moderate or fast pace, but had difficulty recording steps that were very slow or shuffling.

Schneider, Crouter, & Bassett (2004) compared the step values of 13 electronic pedometers, including the Yamax NL-2000, by having individuals wear a criterion pedometer on the left side of the body and a comparison pedometer on the right side. The

NL-2000 was one of four electronic pedometers that provided a reliable assessment of number of steps compared to reference instrument. The authors concluded the Yamax NL-2000 provided a suitable instrument for applied physical activity research.

These studies provide collective evidence for the validity and utility of electronic pedometers for applied research in physical activity. Moreover, electronic pedometers provide an inexpensive method for objectively quantifying physical activity. The Yamax NL-2000 is small, easy to use, and unobtrusive to wear. These may be attributes that make measuring women's physical activity more viable.

Risk Reduction

Body mass index. Body mass index (BMI) measured objective health status at baseline (T1) and risk reduction at discharge (T4) (see Appendix, Demographic Data). A reduction in BMI, in association with the risk modification behaviors of dietary reductions and/ or increased physical activity suggest that risk reduction has occurred. The UNCH-CR and the DCL-CR programs obtain BMI at program initiation and graduation. BMI is an easily obtained estimate of body composition relative to fat and fat-free mass where the constant density of fat = 0.9kg/l and fat-free mass = 1.1kg/l (Keller & Thomas, 1995). Computation of BMI is accomplished by dividing the weight in kilograms (kg) by the square of height in meters.

Graded exercise test. The GXT was used as an objective measure of health status at baseline, but the GXT also represents a standard tool in CR for assessing CHD risk and improvement (Tallaj et al., 2001). A change in maximum aerobic capacity between baseline and discharge measures offers a measure of improvement in functional capacity. Thus, the GXT provides a measure that is easily obtained and quantifiable. The GXT is routinely

obtained by the UNCH-CR before and after program participation. The DCL-CR program obtains the GXT at one time. The GXT was used as a measure of risk reduction in UNCH-CR participants as it is associated with the risk modification behavior of increased physical activity.

Procedures

Recruitment

The following procedures describe the recruitment of participants at UNCH-CR and the DCL-CR. The staff of each facility participate in a weekly multidisciplinary meeting, the UNC staff on Fridays, and the Duke staff on Wednesdays. In addition to discussions of the progress and needs of current participants, the UNC staff discuss potential incoming participants and make plans for contacting the individual, beginning each week with a list of eligible, newly referred patients. The Duke staff review the progress and needs of participating patients and discuss potential new patients.

The PI of the study attended the weekly staff meeting to identify potential study participants. Once potential participants were identified, a flier describing the study was placed in the packet received by new CR participants (see attachment –Flier). Any expressed desire not to be approached by the PI was honored. Tracking the enrollment status of potential participants continued until the participant began the exercise program. The initial exercise testing and performance of the exercise prescription under monitored medical supervision are often associated with higher levels of anxiety (Craig, personal communication, July 12, 2004; Marti, personal communication, May 27, 2004). The participants deal with many new, and sometimes disconcerting, experiences during their first two weeks of contact with the CR program. Requesting additional time and energy during

this stressful period would likely have resulted in a higher number of individuals that declined participation. Therefore, actual contact with potential participants for the purposes of recruiting was delayed until the third or fourth exercise session per the request of both program directors.

Women meeting the admission criteria were approached by the PI. Further discussion with women expressing an interest in additional information occurred after they completed the exercise session for that day, or was scheduled to follow their next exercise session. Explanation and discussion of the study took place in a private room. If the woman agreed to participate, data collection proceeded in the same room. If the woman wished to have additional time to consider participating, an information card briefly describing the study was provided, along with contact information for the PI. Permission to follow-up with the woman at the next CR appointment was requested, at which time information about study purposes and procedures were described in detail.

Quantitative Data Collection

After providing informed consent, participants completed a demographic assessment. Completion of the form usually took no more than five minutes to complete. Data from the participant's performance on the GXT was acquired from the patient chart. Participants were asked two open-ended questions about outcome expectancies and the personal value of the expectancies. Participant responses were recorded on a portable digital recorder and transcribed for later analysis.

The participants were asked to complete a group of self-report measures that operationalized the model concepts. The self-report instruments included the POMS-SF (Shacham, 1983), a measure of social comparison orientation (Heidrich & Ryff, 1993), the

Jenkins Self-Efficacy Expectations Scales for Walking and General Activities (Jenkins, 1989), the Jenkins Activity Checklists for Walking and General Activities (Jenkins), the goal setting scale (Nies et al., 2001), and the Barriers Self-Efficacy Scale (McAuley, 1992). These instruments totaled 139 questions and required approximately 45 to 60 minutes for completion. The participants were given the choice of reading and answering the questionnaires or of having them read to them with answers recorded by the PI. Five of twenty women requested the interview format. The other 15 women chose the option for completing the paper and pencil measures alone. Most of these women worked and had to get to their jobs after CR participation. The completed instruments were identified with a code specific to the participant, thereby ensuring confidentiality. All other data relevant to that participant were similarly coded to maintain confidentiality. The procedures for collection of psychometric data were repeated subsequently on the Wednesday of week four (T_2), week eight (T_3), and week twelve (T_4).

In addition to completing the questionnaires, the participants received the Yamax NL-2000 Activity Monitor (pedometer) with instructions for wearing and operating the device. The participants were to begin wearing a Yamax NL-2000 Activity Monitor each day (Thursday through Sunday) during waking hours. The days Thursday through Sunday were chosen to minimize participant burden by restricting activity monitoring to four, rather than seven, days. In addition, those days minimize monitoring supervised exercise sessions while better capturing naturally occurring activity levels. Only one of four days, Friday, will involve a supervised exercise session. Thus, emphasis was on monitoring activity during days with more leisure time activity and the performance of household chores, activities that have been shown to be relevant for older women (Kimble, 2001). On a few occasions this data

collection schedule interfered with the participant's schedule, so the schedule was changed to a Saturday through Tuesday format, which again monitored only one day of supervised physical activity. Data were entered preserving the entry format of weekend days, supervised exercise day, and routine activity day. The procedure for collecting pedometer data was repeated at week four (T_2), week eight (T_3), and week twelve (T_4).

Study participants received instructions for correctly wearing the NL-2000 (see Appendix, Using & Wearing Your Pedometer). Instructions were nominal since the instrument was chosen for the minimal operation required by the wearer. Relevant instructions included how and where to wear the pedometer/ step counter. This information was provided verbally and in writing. All other functions of the NL-2000 can be pre-programmed. Thus, with preprogramming and a seven day memory capacity, participants were not required to reset the instrument each day. The NL-2000 was picked up from the participant at UNCH-CR and DCL-CR prior to beginning their exercise session on Monday.

All participant information was entered into a database using number identifiers rather than names. Scores on all the self-report measures were entered along with the number of steps and distance walked during the four day data collection period.

Qualitative Data Collection Procedures

All participants completed a self-report measure of social comparison orientation at T_1 and T_4. However, this method provides limited understanding of the thoughts and processes involved in making social comparisons. Therefore, a sub-sample of the study sample was asked to participate in brief interviews, addressing six open-ended questions about social comparisons, during week four at T_2. A sub-sample of women was obtained through purposeful sampling. Sampling continued until theoretical saturation had occurred.

The interviews were conducted in privacy in designated and reserved spaces at both CR facilities. The interviews were recorded and subsequently transcribed by the PI for analysis. All participant information was entered into the database using number identifiers rather than names to maintain confidentiality.

Retention Strategies

Longitudinal studies with repeated-measures design require the participant to remain engaged over time. Moreover, the participants were being asked to complete multiple self-report measures and to wear an activity monitor and over four data collection points. Some participants participated in interviews with open-ended questions to more fully explore the concept of social comparison. All of these data collection strategies provide a rich description of participants' experiences and feelings as they work towards lifestyle change, but also constitute a relatively large respondent burden. In recognition of this and as a thank you for participating, after each data collection point the participant received $20.00 in cash. During the four weeks between data collection points, a cheerful card was mailed, thanking the participant for their continued participation and reminding them of the next data collection. In addition, contacts with participants occurred regularly while the PI was at the CR facilities collecting data and recruiting new participants. Study participants eagerly shared their progress and often wished to talk for a few minutes, even when it was not their day for scheduled data collection.

Pilot

In previous pilot work by the PI, women participated in interviews and provided salivary cortisol samples every three weeks over a three month period. The frequent data collection bears similarity to this dissertation study, but this study entailed more self-report measures

and activity monitoring. Thus, the data collection procedures were pilot tested with the first five participants to better ascertain respondent burden. Three participants were recruited from UNCH-CR and two participants from DCL-CR as part of the pilot testing. All participants denied problems with the data collection procedures or the respondent burden. All participants gladly accepted the $20.00 remuneration.

Data Analysis Strategies

Quantitative Data Analysis

Detailed descriptions of the quantitative data analysis strategies are provided in Chapter Five, which describes the quantitative findings of the study.

Qualitative Data Analysis

Qualitative data analysis strategies are provided in detail in Chapter Six, which provides the results of the social comparisons inquiry.

Limitations

Limitations of the study included the nonexperimental nature of the study design. The minimal amount of control provided through a nonexperimental design leaves the findings open to concerns about validity. Construct validity may be threatened by the repeated measures design in which the participant responds to the same questionnaire over three time periods (Cook & Campbell, 1979). A repeated measures, nonexperimental design also introduces the possibility of several threats to internal validity through maturation, testing, and instrumentation. Additional limitations include the multiple self-report instruments required to measure psychosocial constructs and the attendant participant burden. Another area of concern is beginning data collection after the participants already have completed several exercise sessions. Early thoughts, fears, and feelings may not be adequately reflected

when data collection occurs several days after facing the daunting task of beginning a program of exercise. Finally, the possibility exists that the sample may be restricted in ethnic and socioeconomic diversity, thereby limiting external validity.

Human Subjects Protection

Risks to participants were minimal or nonexistent. Although the potential exists for the participant to experience transient emotional distress when discussing a stressful and challenging transition period in her life, they were informed that they were free to pause or stop the interview at anytime they felt the need or felt they were unable to continue, as well as withdraw from continued participation.

Participants were assured of confidentiality, and that they would not be identified in any way. Quantitative data were handled through the following procedures. Completed instruments were identified with a code specific to the participant, ensuring confidentiality. All other data relevant to that participant were similarly coded to maintain confidentiality.

Informant interviews were transcribed. All names used in the interview were changed to an alphabetical ordering to ensure confidentiality. The audiotapes were erased after transcripts were reviewed and corrected.

Semi-structured interviews took place in a private location to assure confidentiality. Confidentiality and privacy of all data was maintained. Collected data was entered and maintained in a private, secure location. All data will be retained for a minimum of five years, and subsequently will be destroyed by the investigator.

Benefits are possible and may include feelings of relief. Research suggests that women appreciate the availability of someone who will listen to their thoughts, fears, and feelings during the recovery phase (Benson et al., 1997; Fleury et al., 1995). In addition, in

appreciation for their participation in multiple data collections, subjects received $20.00 when turning in completed data at each of four time points. This made it possible for a participant to receive a total of $80.00.

Benefits to participants included adding to knowledge of the process of women's physical and psychosocial adjustment following a heart attack and providing a preliminary basis for designing early interventions to help women adjust.

CHAPTER 4

SELF-EFFICACY AND PHYSICAL ACTIVITY IN WOMEN: AN INTEGRATIVE LITERATURE REVIEW

Background and Significance

Regular physical activity has long been part of the prescription for physical health, its benefits associated with health maintenance and the prevention of conditions such as obesity, diabetes, and cardiovascular diseases (American College of Sports Medicine, 1998). Engaging in regular physical activity assumes an even greater importance for maintaining function and independence with aging (Rejeski, Brawley, Ambrosius, Brubaker, Focht, Foy, & Fox 2003) and for restoring health and function after illness (American College of Sports Medicine). Moreover, increasing physical activity is a central strategy for risk reduction and secondary prevention of coronary heart disease (CHD) and has been associated with increased survival following a myocardial infarction (MI) (Hedbeck, Perk, & Wodlin, 1993).

Women who have experienced a cardiac event, a myocardial infarction, angioplasty, cardiac surgery, or a diagnosis of angina, enter cardiac rehabilitation (CR) programs with higher levels of disability and distress, when compared to men, but realize comparable or even greater improvements in functional capacity, quality of life, psychosocial well being, and CHD risk factor reduction (Houston-Miller, Taylor, & Davidson, 1990; Cannistra, Balady, O'Malley, Weiner, & Ryan, 1992; Lavie & Milani, 1995). However, compared to men, fewer women enroll in CR (Conn, Taylor, & Abel, 1991) and more drop out (Oldridge, 1991). It is surprising that, although research indicates that women recognize physical

activity as a top priority for health behavior change (Mosca, McGillen, & Rubenfire, 1998), women after CR still demonstrate poorer rates of initiating and adhering to increased physical activity behaviors (Blanchard, Rodgers, Courneya, Daub, & Knapik, 2002). Thus, many women fail to realize the improvements and benefits conferred by engaging in a more physically active lifestyle.

Across all ages, women consistently engage in less physical activity behaviors compared to men (Caspersen & Merritt, 1995; Centers for Disease Control and Prevention (CDC), 1993). Women members of ethnic minorities evidence even lower levels of physical activity than do white women (CDC, 1993).

Health Behavior Change

Health behavior change represents a process that begins with the initiation or adoption of a specific behavior followed by adherence to that behavior (Fleury, 1992). Health behavior change may be better understood through investigation of the influence of cognitive and psychosocial factors on the adoption of lifestyle changes (Graves & Miller, 2003; Toobert, Glasgow, Nettekoven, & Brown, 1998). As with many areas of cardiovascular research, much extant research has been conducted with men and little is known about women's initiation of health behavior changes and the influence of behavioral and psychosocial factors (Toobert et al., 1998). Given the large number of women, especially older women, diagnosed and living with CHD (American Heart Association, 2004) we need to further examine and understand the psychosocial factors that influence the adoption of a more heart healthy lifestyle.

Self-efficacy

Research provides support for the role of self-efficacy in the initiation and maintenance of health behavior changes such as increasing physical activity (Gillis, 1993; Holden, 1991). Self-efficacy is the belief in one's ability to successfully accomplish an action and to overcome barriers to accomplishing the task. There are many more studies of adherence behaviors (McAuley, Jerome, Elavsky, Marquez & Ramsey, 2003; Rejeski et al., 2003) than initiation behaviors. However, estimates indicate that 50% to 60% of adults who initiate a behavior change fail to adhere to that change (Marcus, Dubbert, Forsyth, McKenzie, Stone, Dunn, & Blair, 2000), suggesting that a better understanding of the process of behavior initiation could lead to improved understanding of adherence behaviors.

In a review of determinants of physical activity behavior, research indicated that, among the psychological correlates of physical activity, self-efficacy was the strongest and most consistent predictor of physical activity behaviors (Sherwood & Jeffery, 2000). Self-efficacy theory provides the theoretical basis for lifestyle interventions directed at modifying risk factors for CHD (Allen, 1996; Gillis, Gortner, Hauck, Shinn, Sparacino, & Tompkins, 1993; Gortner & Jenkins, 1990), and for the prediction of health behaviors related to lifestyle changes for secondary prevention of CHD. These lifestyle changes include increased physical activity and dietary modifications, both of which are part of secondary prevention (Carlson, Norman, Feltz, Franklin, Johnson & Locke, 2001). However, knowledge of self-efficacy and lifestyle change behaviors in women is limited, and even less is known about women with CHD. Therefore, the purpose of this integrative literature review is to critically examine the current literature on the concepts of self-efficacy and physical activity with a primary emphasis on women, specifically older women and women with CHD.

Methods

Searches of the research databases PubMed, Cumulative Index to Nursing and Allied Health Literature, PsychInfo, and PsychArticle were conducted for primary research articles published between 1990 and 2005. These publishing dates were chosen because of the limited inclusion of women in reports of research findings before 1995 (Crane, Letvak, Lewallen, Hu, & Jones, 2004). Citations in published articles were reviewed for potential articles. Search terms included physical activity, exercise, CR, and self-efficacy. The concept of CHD included the search terms cardiac, coronary, heart, etc. Searches were limited to studies that included adult women.

Self-efficacy is a component of Social Cognitive Theory (SCT) (Bandura, 1986). Although SCT is based on reciprocal determinism and supports the examination of self-efficacy as an outcome variable (Fallon, Wilcox, & Ainsworth, 2005; McAuley, Jerome, Marquez, et al., 2003), for the purposes of this review, articles examining physical activity as an outcome, the correlates of self-efficacy, and self-efficacy as an influencing factor or mediator of physical activity were chosen. Articles examining the initiation of behavior rather than adherence were selected to focus on what is known about the adoption of health behavior change. The adoption or initiation phase of health behavior change occurs during the first six months of activity prior to achieving maintenance. Maintenance, or adherence, behaviors occur after six months of actively engaging in the new health behavior (Marcus, et al., 2000).

Limited studies of populations with CHD were found; therefore the search parameters were expanded to include healthy populations. Moreover, the literature is characterized by limited research with women. Therefore relevant studies including or conducted with men were added. However, to be included, the results of the studies with mixed samples must have

been analyzed differentially by gender. The use of mixed samples is done with the acknowledgement that generalizability of the aggregated findings is restricted. The available literature also evidenced a paucity of research with women of color. Therefore the age parameters were extended to include two studies that incorporated samples of Native American women (Cuaderes, Parker, & Burgin, 2004) and African American women (Sharma, Sargent, & Stacy, 2005).

Selected articles were reviewed to identify the inclusion of women in the study, and if women had been included, whether a differential data analysis by gender had been done. Studies were further evaluated to identify the stage of behavior change with selected studies limited to initiation or adoption behaviors. The concept of self-efficacy was evaluated to see if self-efficacy was evaluated as an outcome, a mediator, a moderator, or as a correlate. Studies were reviewed for the use of theory to guide the investigation. Other study components that were evaluated and coded included whether the sample was composed of a patient population or a community population. The mean age of the sample was evaluated to ensure that older women had been included. If the sample was composed of a clinical population, the type of cardiac event was identified.

Findings

Characteristics of the Studies Reviewed

A total of 54 articles were identified and reviewed for inclusion, resulting in a final selection of 18 journal articles reporting the results of 16 separate studies. Ten articles were published in nursing journals and eight published in other health-related journals focusing on health behavior and education, psychology, and gerontology.

Theory guided 14 studies with Social Cognitive Theory providing the framework for 13 of the studies. Other cited theories included the Transtheoretical Model, the Health Promotion Model, the Revised Health Promotion Model, the Theory of Planned Behavior, and the Cox Interactive Model of Client Health Behaviors. Empirical support guided the two studies that cited no specific theory (Lee, 2005; Wilbur, Miller, Chandler, & McDevitt, 2003).

Samples

Five studies reported in six articles examined physical activity in persons with CHD. The sample sizes ranged from 116 to 570 with a total of 1174 participants. Four of the five studies had samples of less than 200 subjects (average of 151). The fifth study sample contained 570 participants. Healthy populations comprised the samples in 11 studies. Sample sizes ranged from 116 to 628 with a total of 4070 participants across all studies and an average of 226. Women accounted for 52.6 % of the totals in the 10 mixed gender samples, contributing as little as 19.9% (Gillis et al., 1993; Gortner & Jenkins, 1990) to as much as 83% of the sample (Resnick et al., 2000). Six studies included only women (Allen, 1996; Clark & Dodge, 1999; Conn, 1997; Conn et al., 2003; Sharma et al., 2005; Wilbur et al., 2003).

The majority of the studies reported samples that were predominately Caucasian. The proportion of non-Caucasian subjects varied: samples included 11.6% (Clark & Dodge, 1999), 33% (Wilbur et al., 2003) and 56.2% (Clark & Nothwehr, 1999) African American participants. Two studies recruited subjects only from minority groups including Native Americans (Cuaderes et al., 2004) and African Americans (Sharma et al., 2005). Informants' ages ranged from 18 to 100 years with a mean age of 68.7 years. However, without including the younger samples composed of Native Americans and of African Americans with much lower mean ages of 42 and 36.4 respectively, the mean age of subjects for this group of

studies would increase to 73.6 years. The sample descriptions by Gillis and colleagues (1993), Gortner and Jenkins (1990), and Carroll (1995) included the range of subject ages but not the mean age of their samples.

Reporting of sociodemographic data varied. Half of the studies reported educational level, four reported income level, and ten reported marital status. Studies conducted with retirement community dwelling elders reported only marital status with the majority of respondents reporting being unmarried (Resnick et al, 2000; Resnick, 2001a; Resnick, 2001b; Resnick & Nigg, 2003), as did independently living adults (Conn, 1998). Two studies (Carroll, 1995; Lee, 2005) reported on mixed samples of older adults in which more men reported being married and more women unmarried. Half of each of the samples of socio-economically disadvantaged older adults (Clark & Nothwehr, 1999) and Native Americans (Cuanderes et al., 2004) reported being married.

Higher socioeconomic status, operationalized as income or education, has been associated with increased participation in physical activity (Brezinka & Kittel, 1996). Reported annual incomes of samples reviewed here varied from low to modest. In a sample of older adults classified as socio-economically disadvantaged, 78.5% reported annual incomes of less than $12,000.00 (Clark & Nothwehr, 1999), as did women in Carroll's (1995) sample. Carroll identified this as an income disparity by gender with women at an economic disadvantage compared with men. Annual incomes reported by those classified as socio-economically disadvantaged suggested a disparity by ethnicity.

Level of education varied from a majority of college educated participants in samples of cardiac surgery patients (Gillis et al., 1993; Gortner & Jenkins, 1990) and healthy women (Wilbur, Miller, Chandler, & McDevitt, 2003), to a majority of high school educated

participants in the samples of Native Americans (Cuanderes et al.), African American women (Sharma et al., 2005), and retirement community dwelling elders (Resnick 2001a & b). Lee (2005) reported that 87% of the men and women recruited from senior centers had a high school education or more, but compared to men women had lower education levels and income. Clark and Nothwehr's (1999) socioeconomically disadvantaged sample contained only 32% of subjects educated at the high school level, which is below the national average of 71% for adults over age 55. The sociodemographic data from these studies suggest that the majority of the participants would be classified as lower SES. This is not surprising considering the sample characteristics of older age, female gender, and ethnic minority status, which have been associated with social and economic disadvantages (Rankin, 1995; Young & Kahana, 1993).

Recruitment sites for study samples varied widely with the exception of samples of persons with CHD. Study participants were recruited during hospital admissions for cardiac events (Allen, 1996; Carroll, 1995; Gillis et al., 1994; Gortner & Jenkins, 1990; Jenkins & Gortner) and through a review of patient medical records (Clark & Dodge, 1999). Healthy samples came from retirement communities (Resnick, 2001 a & b; Resnick & Nigg, 2003; Resnick et al., 2000), primary care clinics (Clark & Nothwehr, 1999), senior centers (Lee, 2005), a Native American health clinic (Cuaderes et al., 2004), and community centers and churches (Sharma et al, 2005). Another set of studies with healthy populations recruited older adults living independently in the community (Conn, 1997; 1998; Conn et al., 2003).

Study Designs and Methods

Descriptive designs were used in 14 (77.7%) of the 16 studies, with 4 studies (22.3%) using experimental and quasi-experimental designs. Cross-sectional, correlational designs

dominate the studies reviewed, accounting for 58.8% (10) of the study designs. This is surprising in light of the long-term nature of investigations conducted in the area of exercise behaviors. It would seem that the state of the science would be further advanced with more experimental and longitudinal work available to characterize the process of behavior change. Six studies (33.3%) employed a prospective longitudinal design with the number of data collection points ranging from two to six times and intervals from weekly data collection to a six month interval between data collection. Explanations for the choice of data collection points were not provided.

Self-referent thoughts must, obviously, be evaluated through the use of self-report measures. However, in the studies reported here, there is an overwhelming preponderance of mono-method bias (Waltz, Strickland, & Lenz, 1991) with self-report measures for all variables. Three studies were an exception with exercise behaviors measured by 20 minutes of actual aerobic exercise verified with attendance records (Resnick, Palmer, Jenkins, & Spellbring, 2000), a heart rate monitor (Wilbur et al., 2003), and a 6-minute walk (Clark & Dodge, 1999). The Jenkins' Activity Checklists measured walking and general activities in four studies in samples with CHD (Carroll, 1995; Gillis et al., 1993; Gortner & Jenkins, 1990; Jenkins & Gortner, 1998), providing consistency in the measurement of self-reported activity/ exercise. Measures of internal consistency ranged from .53 to .96. Allen (1996) and Sharma and colleagues (2005) operationalized physical activity as the 7-day Activity Recall. The Exercise Subscale of the Health Promoting Lifestyle Profile operationalized activity in healthy samples (Conn, 1998; Conn et al., 2003), although Conn (1997, 1998) also employed the Baecke Physical Activity Scale. Other questionnaires for assessing physical activity included the Physical Exercise Questionnaire, developed specifically for the study (Cuaderes

et al., 2004), the Habitual Physical Activity Questionnaire (Lee, 2005), and the Yale Physical Activity Survey (Resnick, 2001 a & b). Self-reports of activity included the number of blocks walked per day (Allen), the current level of exercise (Clark & Dodge, 1999), the personal definition of current exercise (Clark & Nothwehr, 1999), 20 minutes of exercise 3 times per week (Resnick & Nigg, 2003), 20 minutes of aerobic activity (Resnick et al., 2000), and an exercise log (Wilbur et al., 2003).

A predominance of self-report measures were used to assess physical activity behaviors but investigators used some objective measures of physical activity including attendance at exercise sessions in the retirement community (Resnick et al., 2000), and corroborating adherence to walking with heart rate monitors (Wilbur et al., 2003). Clark and Dodge (1999) asked a single question about exercise behaviors, but also had participants engage in a Six-Minute Walk Test to evaluate actual exercise capacity. The limited number of objective measures of physical activity and the reliance on self-report measures raised a concern about the possibility of respondents providing socially desirable responses rather than accurate self-reports of behavior.

In thirteen studies (72.2%), investigators employed interviews in a face-to-face format or via the telephone to gather data. Three investigators administered paper and pencil measures. Methods of measurement included a variety of self-report surveys and questionnaires to assess self-efficacy (Table 4.1). The Jenkins Self-efficacy Expectations for Walking Scale was the most frequently used measure of self-efficacy for samples with CHD. This is a very appropriate measure as it was developed specifically for use with cardiac patients. Internal consistency coefficients ranged from a low of .76 to .98 (Carroll, 1995; Gillis et al., 1993; Gortner & Jenkins, 1990; Jenkins & Gortner, 1998). The McAuley Self-efficacy Scale for

Table 4.1

Summary of Reviewed Studies

Author, year	Type	Participants	Instrumentation/ Theory	Key Findings
Allen (1996)	Theory based intervention, Longitudinal	116 women, clinical heart surgery	Activity- blocks walked/day 7 day activity recall Social Cognitive Theory	No significant difference between control & intervention groups for activity Minimal activity increase all participants.
Carroll (1995)	Descriptive, Longitudinal	133 mixed, clinical heart surgery 32 women	Activity- Jenkins Activity Scale for Walking Efficacy - Jenkins Self-efficacy Expectations for Walking Self-efficacy Theory Self-care Theory	Significant change in self-efficacy (SE) for walking over time SE mediated between self-care agency & behaviors Elderly have lower physical activity levels & slower recovery Women had lower SE scores until 12 weeks, then improved to men's levels

Table 4.1: *(Continued)* Summary of reviewed studies

				SE for walking exceeded SR of behavior
Clark & Dodge (1999)	Descriptive, Longitudinal	570 women, clinical heart disease	Activity - Self report current exercise 6 minute walk Efficacy – Single item rating perceived efficacy Self-efficacy Theory	6 minute walk at 4 months, but not 12, predicted by baseline SE SE significant for exercise @ 4 & 12 months
Clark & Nothwehr (1999)	Descriptive, Cross-sectional	628 mixed 440 women	Activity - Personal definition current exercise Efficacy - 3 items created for study Self-efficacy Theory	Lower SE in women Lower SE associated with age & ethnicity Women reported many environmental barriers – fear of falling & pain

Table 4.1: *(Continued)* Summary of reviewed studies

Conn (1997)	Descriptive, Cross-sectional	225 older women	Activity - Baecke Physical Activity Scale Efficacy - 6 exercise items created for study Social Cognitive Theory	SE strongest predictor of exercise health behavior
Conn (1998)	Descriptive, Cross-sectional	147 mixed 102 women	Activity - Health Promoting Lifestyle Profile Baecke Physical Activity Scale Efficacy – McAuley Self-efficacy for	SE had direct significant effect on outcome expectancies Barriers had indirect negative effect on exercise

			Exercise Scale Social Cognitive Theory	
Conn, et al. (2003)	Descriptive, Cross-sectional	203 women	Activity - Exercise subscale of the Health Promoting Lifestyle Profile Efficacy – McAuley Self-efficacy for Exercise Scale Social Cognitive Theory Theory Planned Behavior Transtheoretical Model	HPLP scores indicated low activity levels SE had direct significant effect on exercise
Cuaderes, Parker, & Burgin (2004)	Descriptive, Cross-sectional	483 mixed 240 women	Activity - Physical Exercise	SE, barriers, & motivation predicted 93% of women exercisers & 32% non-exercisers

Table 4.1: *(Continued)* Summary of reviewed studies

		Native Americans	Questionnaire Efficacy – Physical SE Questionnaire	
Gillis et al. (1993)	Theory based intervention, Longitudinal	156 mixed, clinical heart surgery 31 women	Activity - Jenkins Activity Checklist Efficacy – Jenkins Self-efficacy Expectations for Walking & General Activities Social Cognitive Theory	Significant treatment effect for walking All activities improved over time SE increased to week 8 and had ceiling effect after week 12 Limited intervention effect on increasing SE Robust significant correlation between SE & SR walking
Gortner & Jenkins (1990)	Theory based intervention, Longitudinal	156 mixed, clinical heart surgery 31 women	Activity - Jenkins Activity Checklists for Walking &	SE @ 12 wks predicted activity @ 24 wks. SE very dynamic weeks 4-12 Ceiling effect for SE weeks 12 - 24

Table 4.1: *(Continued)* Summary of reviewed studies

			General Activities	Women had lower levels of activity all times
			Efficacy - Jenkins Self-efficacy Expectations for Walking & General Activities	
			Social Cognitive Theory	
Jenkins & Gortner (1998)	Descriptive. Longitudinal	199 mixed, clinical heart disease 48 women	Activity Jenkins Activity Checklist For Walking	Women had lower SE and self-reported walking at all time points, but improved over time
			Efficacy - Jenkins Self-efficacy Expectations for Walking	SE & walking significantly correlated at all time points SE predicted behavior @ same measurement

Table 4.1: *(Continued)* Summary of reviewed studies

Jenkins & Gortner (1998)			Social Cognitive Theory	point and all time points No ceiling effect observed for SE
Lee (2005)	Descriptive, Cross-sectional	276 mixed, 190 women	Activity - Habitual Physical Activity Questionnaire	Women engaged in fewer hours and less varied activities than men Women reported • 3.5 hours/week activity • more household activities
			Efficacy – Self-confidence for Exercise Scale	70% reported walking, no gender difference Fewer women reported engaging in recommended levels of physical activity
			Empirical support	SE scores lower in women Older women reported more barriers

Table 4.1: *(Continued)* Summary of reviewed studies

Resnick (2001 a & b)	Descriptive Exploratory Cross-sectional	175 mixed 136 women	Activity - Yale Physical Activity Survey Efficacy – Self-efficacy Expectations for Exercise Social Cognitive Theory	Level of exercise associated with SE & physical health Mental & physical health predict SE
Resnick & Nigg (2003)	Descriptive Cross-sectional	179 mixed 135 women	Activity - Self report of 20 minutes exercise 3 times/week Efficacy – Self-efficacy Expectations for Exercise Transtheoretical Model	55% reported engaging in regular exercise SE was related to exercise behaviors

Table 4.1: *(Continued)* Summary of reviewed studies

Resnick et al. (2000)	Descriptive Cross-sectional	187 mixed 155 women	Activity - 20 minutes aerobic activity Exercise attendance verified Efficacy - Revision of SE Barriers Social Cognitive Theory	SE directly related to exercise 38% reported 20 minutes aerobic exercise 3 times/week Women had lower SE scores Mood indirectly related to exercise via SE
Sharma et al. (2003)	Descriptive Cross-sectional	240 women, African American	Activity - 7 day Moderate Physical Activity Recall Efficacy - Gonzalez Global SE Scale (5 behaviors w/walking) Empirical support	Accumulated leisure activity only 88 minutes/week Low SE scores for walking & total activity

Table 4.1: *(Continued)* Summary of reviewed studies

Wilbur et al. (2003)	Experimental Longitudinal 24 wks walking	153 women	Activity - HR monitor & exercise log Efficacy – McAuley SE for Exercise (for 6 minute walk) Cox Interaction Model of Health Behavior	SE decreased for African American women over time, but they started higher Baseline SE predicted adherence to wallking Adherence to frequency 66.5%, duration & intensity 90%

Exercise was used in three studies with well populations (Conn, 1998; Conn et al., 2003; Resnick et al., 2000). Cronbach's alpha statistics ranged from .89 to .92, but was unreported in the study by Resnick and colleagues. Self-efficacy was measured with a variety of self-efficacy scales. No reliability estimates were reported for a survey that had been constructed for use in two studies (Clark & Dodge, 1999; Clark & Nothwehr, 1999). Conn (1997) used a constructed survey and reported an alpha of .89. The Self-efficacy for Exercise Scale developed by Resnick & Jenkins (2000) was used with community dwelling older women in three studies with internal consistency reported between .92 to .95 (Resnick, 2001 a & b; Resnick & Nigg, 2003).

Statistical analyses included six correlational analyses, six path-analyses or structural equation modeling (SEM), and five analysis of variance procedures. The analysis procedures used were appropriate for the aims of the studies, with the majority of the studies investigating the relationships among psychosocial variables and physical activity, or predicting relationships. The limitation of path analysis is that it does not allow for the evaluation of reciprocal relationships (Conn, 1998; Conn et al., 2003; Resnick, 2001b; Resnick et al., 2000), which is vital in studying the concept of self-efficacy. As Bandura (1986) has explained, self-efficacy increases in response to the performance of a behavior, and the behavior continues as self-efficacy increases.

Analysis of variance procedures were appropriately used to investigate differences in groups participating in interventions (Allen, 1996; Gillis et al., 1993; Gortner & Jenkins, 1990), in self-identified exercisers versus non-exercisers (Cuaderes et al., 2004), and in African American and Caucasian women's adherence to a 24 week walking program (Wilbur

et al., 2003). Carroll (1998) used a repeated measures analysis of variance to better characterize change over time in a sample of cardiac patients.

Self-efficacy

Self-efficacy theory is a component of Bandura's Social Cognitive Theory (Bandura, 1986). Bandura conjectures that an individual's perception of their ability to accomplish a specific behavior affects their level of motivation, thought processes, emotional responses, and the actual behavior. Self-efficacy beliefs are developed from four sources of information listed here in order of influence: (a) mastery experience, or actually performing a behavior; (b) vicarious experience, when an individual observes another successfully enact a behavior; (c) verbal persuasion, that involves exposure to the verbal judgment of others (Bandura), but has also been operationalized as persuasion through education (Carlson et al., 2001; Gortner & Jenkins, 1990; Gillis et al,1993); and (d) emotional and physiological states such as anxiety, stress, arousal, and fatigue.

An individual's behavior-specific self-efficacy beliefs are developed through expectancies regarding how events are connected, what the outcome expectancies, or the consequences of a behavior will be, and whether one is competent to accomplish a specific behavior (Bandura, 1986). When a new behavior is enacted, the individual receives feedback about the behavior from two sources. First, when the behavior produces the desired results, outcome expectancies are met. Second, because outcome expectations are met, the individual experiences confidence, or enhanced efficacy, in continuing the behavior. Both forms of feedback are likely to result in the behavior being repeated. Bandura postulates that self-efficacy expectations are more potent in determining behavior than outcome expectancies,

but research has shown that both may operate in shaping behavioral choices (Clark & Dodge, 1999; Conn, Burks, Pomeroy, Ulbrich, & Cochran, 2003; Resnick et al, 2000).

Two randomized clinical trials (RCTs) of interventions based on Social Cognitive Theory and Self-efficacy Theory (Bandura, 1986) provided support for the influence of self-efficacy on behaviors associated with lifestyle changes. In samples of cardiac surgery patients, significant treatment effects were found for increased general activities (Gortner & Jenkins, 1990), and increased walking behavior (Gillis et al., 1993; Gortner & Jenkins, 1990), supporting Bandura's proposition that increased self-efficacy for a specific behavior is associated with an increased performance of the behavior. However, in another study, Allen (1996) found no significant group differences in physical activity behaviors between the control and special intervention (SI) groups. The lack of significant findings may have been due to intervention weakness. Intervention strategies were enacted from the four sources of information and were designed to enhance self-efficacy, performance accomplishments, verbal persuasion, physiological cues, and vicarious experience. Performance accomplishments are usually the most influential source of efficacy information because they are based on actual experiences (Bandura, 1986). In the intervention, performance accomplishments were enacted through verbal goal setting and rehearsing the desired behaviors with a nurse. These role-playing activities provide limited actual experience. Vicarious experience was provided through the viewing of an American Heart Association videotape in which a model enacted behaviors associated with a positive outcome and recovery. This is a generic form of vicarious experience, which may lack the strength associated with experiences gained through actually interacting with a role model.

Results of both non-experimental studies provide further support for the role of self-efficacy in relation to physical activity behaviors. Self-efficacy predicted subjective and objective measures of exercise and physical activity behaviors (Clark & Dodge, 1999; Conn, 1997; Cuaderes et al., 2004; Jenkins & Gortner, 1998; Resnick 2001b). Cuaderes and colleagues (2004) found that self-efficacy, combined with barriers and motivation, accurately identified 93% of the Native American women categorized as exercisers. Additional evidence for the role of self-efficacy is provided through the results of multiple correlational analyses in which self-efficacy was consistently and positively related to walking behaviors and exercise behaviors (Clark & Dodge, 1999; Conn et al., 2003; Resnick, 2001b; Resnick et al., 2000). The results of a single study indicated that self-efficacy mediated the relationship between self-care agency and self-care behaviors, including physical activity, and indirectly influenced exercise behavior through mood (Carroll, 1995).

In the studies that reported a differential analysis of data by gender, women reported significantly lower self-efficacy scores compared with men (Clark & Nothwehr, 1999; Resnick et al., 2000), with improvement over time in longitudinal analyses (Carroll, 1995; Gillis et al., 1993; Jenkins & Gortner, 1998). In Wilbur and colleagues' (2003) evaluation of adherence to a walking program, African American women, as compared to their Caucasian counterparts, began with higher self-efficacy scores at baseline. However, by week 24 their self-efficacy scores had declined to lower levels than the Caucasian women.

Physical Activity

The findings related to physical activity behaviors of women support previous findings in which women engaged primarily in low levels of activity (Caspersen & Merritt, 1995; Centers for Disease Control, 1993). The intervention research with samples of CHD patients

revealed overall low levels of activity (Allen, 1996; Gillis et al., 1993; Gortner & Jenkins, 1990). Allen found minimal differences between treatment and control groups for levels of physical activity, while Gillis and colleagues found a significant treatment effect for walking. Wilbur et al. (2003) administered a 24 week home-based walking intervention then evaluated the differences between African American and Caucasian women. Adherence to the duration and intensity of the intervention exceeded 90%, but only 66% of the women adhered to the frequency of the walking intervention, with significantly fewer ($p = .001$) African American women adhering compared to the Caucasian women. Clark and Dodge (1999) provided no description of the results of the 6 minute walk test, discussing it only in the context of being predicted by the psychosocial variables. Carroll (1995) found, in the mixed sample of cardiac surgery elders, that post-operative levels of physical activity were low and that recovery time was slower compared to younger persons. At 12 weeks after surgery, participants walked an average of six blocks while in previous studies post-cardiac surgery elders were walking ten blocks. An additional finding was that self-efficacy for walking exceeded self-reports of walking.

Reported physical activity levels in healthy samples corresponded to the low levels in CHD samples. Conn (1997) reported a mean score on the Baecke Physical Activity Scale of 1.18 (range 1 to 4) indicating low levels of activity, with similar results obtained using the Health Promoting Lifestyle Profile to measure activity (Conn et al., 2003). Women's levels of self-reported walking remained low at all time points, although it improved over time (Jenkins & Gortner, 1998). Similarly, low levels of walking were reported in a cross-sectional survey of African American women (Sharma et al., 2005). Fifty-five percent of the elders residing in a retirement community reported participating in regular exercise (Resnick & Nigg, 2003),

while only 38% of another retirement community dwelling sample reported engaging in 20 minutes of aerobic activity (Resnick et al., 2000).

Lee (2005) reported unusually high levels of activity in a mixed sample of 276, including 190 women, recruited from senior centers. Seventy percent of the sample reported walking with no differences in walking by gender. Women in this study reported participating in a total of 3.5 hours per week of physical activity, although compared to men they engaged in fewer hours and less varied activities. However, unlike other samples of older women, the activity level for this sample met, and even exceeded, national recommendations. The recommendations suggest engaging in light to moderate leisure-time physical activities for equal to or greater than 30 minutes equal to or greater than 5 times per week or engaging in vigorous leisure-time physical activities for equal to or greater than 20 minutes equal to or greater than 3 times per week (Healthy People 2010). This sample may represent a special population of more active older adults, actively engaged in senior center activities, the site from which they were recruited. This conclusion seems apparent since they reported activity levels above the women in other studies and above national recommendations.

Perceived barriers to physical activity have been shown to negatively affect physical activity behaviors (Conn, 1998). Barriers identified by women in other studies include poor self-esteem, high levels of perceived stress, the lack of money, time, and skills (Mosca, et al., 1998), as well as beliefs about exercise (Cousins, 2000), experiences of fatigue and discomfort (Moore & Kramer, 1996), fear of having a heart attack while exercising, and experiencing anginal pain in the morning (Blanchard et al., 2001). Previous studies also have identified additional barriers including age, comorbidities, and lack of physician recommendations (Lieberman, Meana, & Stewart, 1998). In this group of studies, women

identified more barriers to physical activity than did men, including the fear of falling and of experiencing pain related to exercise (Clark & Nothwehr, 1999; Lee, 2005). The number and variety of women's perceived barriers to physical activity become particularly salient when considered in relation to their low levels of self-efficacy, as individuals with low self-efficacy easily convince themselves that their efforts are futile when they are confronted with difficulties or barriers (Bandura, 1990).

Discussion

Measurement

Multiple methodological issues were found in the group of studies reviewed here. In addition to the limited number of women participating in the studies, the samples composed of CHD patients were predominantly cardiac surgery patients. Clark and Dodge (1999) studied older women with a diagnosis of CHD, but the length of time since diagnosis varied widely from 6 months to 29 years resulting in a lack of clarity about the impact and severity of the CHD diagnosis and the stage of behavior change being studied. Several other studies did not identify whether initiation or adherence behaviors were being studied (Allen, 1996; Resnick et al., 2000). No samples were composed of patients recovering from an MI or angioplasty. Thus, much remains to be known about the processes involved in the early efforts at lifestyle adjustment by women recovering from a cardiac event.

The healthy populations represent convenience samples that may not be representative of the general elderly population. Retirement centers frequently offer exercise classes and other forms of physical activity promotion as do senior centers, suggesting that the results of the studies with these samples may be over-estimating physical activity behaviors in the larger older adult population, many of whom may not have easy access to such exercise

opportunities, may be more isolated, or may have no idea how to initiate regular physical activity, or may be fearful of doing so.

The plethora and variety of physical activity measures complicates comparisons across studies and indicates that little consensus exists about the conceptual or operational definitions of physical activity. Although the term physical activity is a broad concept that incorporates exercise and physical fitness, it is difficult to compare results across studies, other than in a broad sense, when definitions vary so widely. Moreover, given the limited number of older women participating in vigorous physical activities, consideration should be given to the validity and representativeness of the physical activity definitions and measures chosen to assess this population. Interpretation and synthesis of these study findings is hampered by these persistent measurement issues.

The overwhelming reliance on self-report instruments to quantify a behavior calls in to question the validity and reliability of these physical activity measures. Self-reports of activity may be subject to over-inflation and a desire to provide the appropriate and socially desirable response. Behavioral variables are amenable to measurement with objective instruments as a means to corroborate self-report measures and to directly quantify behavioral variables.

In other instances the use of self-report instruments is appropriate as with measures of self-efficacy. The Jenkins Self-efficacy Expectations for Walking and General Activities Scales were used with the same frequency as the corroborating Jenkins Activity Checklist (Carroll, 1995; Gillis et al., 1993; Gortner & Jenkins, 1990; Jenkins & Gortner, 1998). This allows for valid comparisons between studies. Self-efficacy was measured with a single item as part of a questionnaire (Clark & Dodge, 1999), as the self-efficacy subscale of an unnamed barrier

instrument, and as a subscale of the McAuley Exercise Scale (Conn et al., 2003), making comparisons between studies difficult and perhaps not adequately elucidating a complex psychosocial process.

Data Collection

The most significant measurement issues are the limited assessments of process during the initiation of lifestyle changes and of the temporal relationships of self-efficacy to lifestyle change behaviors. Even in those studies that employed a repeated measures, longitudinal design, the period between weeks 12 through 24 remained unexplored across studies. Bandura (1986) asserts that to accurately assess the relationship between self-referent thoughts and action, measurement must occur in close temporal proximity, requiring that self-efficacy be measured periodically to better evaluate and understand the effect of experiences on behaviors. Moreover, long intervals between data collection points create an assumption of stasis in behavioral change rather than allowing observation of the dynamic processes and interplay among factors (Brown & Moskowitz, 1998). Points of vulnerability for increased sedentary behavior occur at different stages (Marcus et al., 2000), and may be missed by single occasion measurement, or measurement separated by long intervals (Brown & Moskowitz).

Summary and Conclusions

In summary, findings from these studies suggest that much remains to be done to promote and improve physical activity levels in older adults, especially women. Regular physical activity helps with maintaining function and independence with aging (Rejeski, et al., 2003), as well as restoring health and function after illness (Blair, Horton, Arthur, Lee, Drinkwater, Dishman et al, 1996)**.** The American population continues to experience a surge in the

population of older adults, including more with disabilities and chronic illness. In the near future, society is facing the possibility of caring for a large, chronically ill population with limited resources and independence. Current statistics indicate that women comprise the majority of the population age 70 and over (US Census, 2000)**,** clearly highlighting the critical need to promote and facilitate the initiation and adherence to increased physically activity behaviors in older women.

Implications for Research

A strength of this group of studies is the use of theory to direct the investigations. With inquiry guided by theory, research findings show that enhancing self-efficacy beliefs may provide an effective and easily administered mechanism for promoting the individual's confidence in engaging in a more physically active lifestyle. However, women's lower levels of self-efficacy for physical activity and more perceived barriers to activity suggest that the cognitive and psychosocial factors that influence health behavior change function differently in women compared to men. Moreover, much of the research on the process of behavior change has occurred retrospectively and with single occasion measurement, leaving much to be discovered about the temporal variations that occur between self-referent thinking and behavior change. Thus, future research should be characterized by the inclusion of more women; more prospective, longitudinal, repeated measures study designs; and more objective measures of behavior. Future research to better understand women's, especially older women's, health behaviors and efforts to enact positive changes could result in increased participation by women in physical activity behaviors, with more women realizing the attendant benefits and improved quality of life associated with regular physical activity.

Implications for Practice

Nurses occupy a unique position with the public in terms of image and access. The public consistently identifies nurses as some of the most trusted and trustworthy individuals (Ulrich, 2001). Moreover, nurses work in a variety of health care settings and provide service throughout their communities making them both visible and accessible. Thus, nurses can initiate opportunities to discuss the importance of engaging in regular physical activity with women, emphasizing the health benefits for females of all ages.

Women may be unsure of what type of physical activity behaviors would be best suited. The results of these studies suggest that the preferred form of physical activity for older persons is walking, which also has the benefits of being free and requiring no specialized skills. Nurses can provide suggestions for initiating and continuing a program of regular walking. This includes assistance with identifying and setting realistic goals as well as identifying barriers to physical activity and possible solutions for overcoming the barriers. Other suggestions for increasing physical activity include assisting older women with identifying opportunities to increase daily lifestyle activities, such as increasing yard work and household activities. Another suggestion would be that women may prefer participating in water aerobics, an activity designed for those with back, hip, and knee discomfort. Moreover, through highlighting the benefits that are being realized with continued physical activity, the nurse is delivering a form of verbal persuasion (Bandura). For example, the nurse can recognize and praise improvements in body weight, BMI, muscle tone, flexibility, stamina, blood pressure, and cholesterol levels.

Self-efficacy for physical activity can be enhanced through positive reinforcement of increased physical activity behaviors, a form of enhancing the mastery experience (Bandura,

1986). Self-efficacy is situation specific and sensitive to changes, and should be evaluated through conversations with women, and encouraged and supported as needed. Given the low levels of physical activity demonstrated by many older women, there exist many opportunities to facilitate their engagement and participation in physical activity behaviors.

CHAPTER 5

PHYSICAL ACTIVITY IN WOMEN DURING CARDIAC REHABILITATION

Coronary heart disease (CHD) accounted for 20% of deaths from all causes in the United States (U.S.) in 2001, and claimed the lives of 687,000 Americans (American Heart Association, 2004). Historically, CHD has been regarded as a man's disease, but almost half of these deaths were in women, indicating that CHD is the leading cause of death and premature disability for women as well as for men (American Heart Association). Moreover, the incidence of CHD increases 2 to 3 fold in women after menopause and especially after age 70 (American Heart Association), creating a significant threat to independence and quality of life in women over age 50 (Speroff, 1993). Thirty-eight percent of the women diagnosed with a myocardial infarction (MI) will die within the first year. After six years 35% of women with an initial MI will experience another MI, 11% a stroke, 5% sudden cardiac death, and 46% cardiac failure. These poor outcomes are attributed to women's older ages (American Heart Association), but may also be influenced by limited efforts made towards secondary prevention.

Although research specific to the adjustment and recovery of women following a cardiac event (myocardial infarction (MI), coronary revascularization, and radiological interventions with angioplasty or stent insertion) is limited, empirical evidence suggests that, compared to men, women are less physically, sexually, and socially active following an MI (Hamilton, 1990; Hamilton & Seidman, 1993) or coronary artery bypass grafting (CABG) (Fleury &

Cameron-Go, 1997). King, Rowe, and Zerweck (2000) found that women at three months post MI were returning to their normal activities at a slower rate than men.

Formal programs of cardiac rehabilitation (CR) facilitate not only a return to normal activities but also making lifestyle changes that improve physical health and psychological well-being (Ades, 2001). Increasing one's level of physical activity following a cardiac event represents a major constituent of the rehabilitation prescription for recovery after diagnosed CHD (American Heart Association, 2004). In addition to physical health, other benefits of regular physical activity include health maintenance, the primary or secondary prevention of conditions such as obesity and cardiovascular diseases, and health restoration after illness. Benefits for CHD and CHD risk factors conferred by participation in regular physical activity included decreased plasma lipids and lipoproteins, body weight and body fat reduction, and decreased blood pressure (Garber, 1997).

Clearly, by increasing physical activity patterns following a cardiac event, many benefits are accrued. In spite of the advantages, research indicates that increased physical activity behaviors decline dramatically during the months following a cardiac event, with drop-out rates during the first 6 months ranging between 30% and 70% (Miller, 1997). Compared to men, women engage in less leisure time activity (Mosca, McGillenn, & Rubenfire, 1998); participate less in formal rehabilitation programs and drop-out at higher rates (Conn et al., 1991); and have significantly worse exercise adherence (Blanchard, Rodgers, Courneya, Daub, & Knapik, 2002). Thus, women fail to realize the improvements and benefits conferred by engaging in a more physically active lifestyle.

Health behavior change represents a process that begins with the initiation or adoption of a specific behavior followed by adherence to that behavior (Fleury, 1992). Maintenance or

adherence behavior is defined as the continuation of physical activity behavior beyond six months following adoption (Marcus, Dubbert, Forsyth, McKenzie, Stone, Dunn, & Blair, 2000). Consequently, the adoption or initiation phase of health behavior change occurs during the first six months of activity prior to achieving maintenance. Adherence to a more physically active lifestyle following an MI or coronary revascularization has been examined (King et al., 2000; Moore, Ruland, Pashkow, & Blackburn, 1998), but scant research has provided a prospective view of the initiation of cardiovascular lifestyle changes.

Although health behavior change is an ongoing process, characterized by initiation, relapse, and re-initiation behaviors (Fleury, 1997), few studies have examined the process of behavior change, instead focusing on outcomes rather than process (Oldridge, Guyatt, Crow, Feeny, & Jones, 1999; Rankin, 2002; Song & Lee, 2001). Studying process offers an opportunity to observe the dynamics of behavior over time by placing the behavior in the temporal context in which it occurs (Brown & Moskowitz, 1998). Single occasion measurement assumes that psychological and physical indices of behavior change are static or slow-changing. Temporal or process measurement allows the exploration of situational or contextual correlates and determinants of health behaviors. The study of process permits observation of the extent to which behavior reflects stable characteristics rather than a state; pinpoints important temporal antecedents of physical or psychological events; sheds light on the adaptive or maladaptive significance of the behavior in terms of the context in which it is expressed; and serves as a guide to health behavior interventions (Brown & Moskowitz). The process approach to studying health behavior change offers an idiographic and nomothetic view of these complex human endeavors.

In order to better understand the processes of health behavior change, studies are needed to investigate the influence of psychosocial factors on the adoption of lifestyle changes (Graves & Miller, 2003; Toobert, Glasgow, Nettekoven, & Brown, 1998), including self-efficacy expectations, perceived barriers, and age as predictors of exercise at different stages of health behavior change (Conn, 1998). The process of initiating a more physically active lifestyle can be better understood when individual values, attitudes, and beliefs are included in studies of behavior change (Fleury, 1991). Moreover, more research is needed on the societal, cultural, ethnic, and personal factors involved in differential patterns of adoption and maintenance of lifelong physical activity (Fletcher, et al., 1996; Marcus, et al., 2000).

Few studies have described individual, environmental and psychosocial factors and processes or their temporal relationship to the initiation of a more physically active lifestyle. Therefore, the purpose of this study was to describe and explore, for women who have had a cardiac event, the processes and temporal patterning of contextual factors and behavioral change processes involved in the initiation and early adoption of increased physical activity behaviors.

Conceptual Framework

The theory of wellness motivation incorporates concepts from deductively generated behavioral models to explain the initiation of lifestyle change efforts and the maintenance of sustained behavioral change (Fleury et al., 1997). However, the theory goes beyond the more traditional behavioral models by including concepts specific to the individual, such as the influence of factors that may function as barriers to behavior change. It also allows for investigation of the processes through which changes in health behavior occur. Traditional theories of health behavior change provide for the observation and prediction of behaviors,

but may not include the multiple individual and environmental factors that influence the initiation and maintenance of behaviors as they change over time (Brown & Moskowitz, 1998; Fleury, 1992).

The theory of wellness motivation consists of three dimensions: contextual influences, behavioral change processes, and action. Contextual influences originate from within the individual or as part of the individual's environment, and behavioral change processes and action occur within this milieu of personal, social, and cultural factors. Contextual influences include biologic, environmental, and social factors as part of the interactive relationship between the individual and the environment. They affect and are affected by individual values, goals, expectancies, and plans (Ewart, 1991), shaping efforts at risk modification and health behavior change.

Biologic factors influence the individual's capacity to enact health behavior changes. These factors include individual characteristics and the physical and psychological capacities to engage in risk reduction. Fleury and colleagues (1997) note that biologic factors ". . . include the capacity to undertake the activities and requirements of daily life, as well as physical and mental well-being" (p. 28).

Environmental factors consist of aspects of the physical environment which may affect risk modification efforts (Fleury et al., 1997). Environmental factors include access to resources, patient-provider interaction, perceived convenience and safety, transportation, and the individual's response to the physical and social environment. Other environmental factors include the dynamic resources of time, money and information, which are frequently characterized by measures of socioeconomic status (SES).

Social factors play a dominant role in lifestyle changes by promoting or inhibiting efforts towards change (Fleury at al., 1997). These include support from family, friends, and social networks. Social networks can include peer networks formed by individuals attending CR programs. Women may respond to an MI by talking about what it means, asking questions, and seeking validation from others (Arnold, 1997; Fleury et al., 1995), enhancing their ability to cope with uncertainty and to better understand the meaning of lifestyle changes (Arnold). Moreover, observing someone else's successes in making lifestyle adjustments can function as a powerful source of support and motivation in the CR environment (Fleury et al., 1995).

The second dimension in the theory of wellness motivation is behavioral change processes which include self-knowledge and motivation appraisal. Self-knowledge, an aspect of the self-concept, represents the individual's motivational needs in the form of goals and provides the means-ends patterns that are necessary for new behavior (Markus & Nurius, 1986; Markus & Ruvulo, 1989). These goals are further determined and influenced by self-efficacy, the belief in one's ability to successfully accomplish a task (Bandura, 1986). In self-efficacy theory, a component of Bandura's Social Cognitive Theory (1986) an individual's perception of their ability to accomplish a specific behavior affects their level of motivation, thought processes, emotional responses, and the actual behavior. Self-efficacy beliefs are developed from four sources of information listed here in order of influence: (a) mastery experience, or actually performing a behavior; (b) vicarious experience, when an individual observes another successfully enact a behavior; (c) verbal persuasion, involving exposure to the verbal judgment of others (Bandura), but also operationalized as persuasion through education (Carlson, Norman, Feltz, Franklin, Johnson & Locke, 2001; Gortner & Jenkins, 1990; Gillis,

Gortner, Hauck, Shinn, Sparacino, & Tompkins, 1993); and (d) emotional and physiological states such as anxiety, stress, arousal, and fatigue.

Motivation appraisal constitutes a crucial step in the change process as it guides the formation of intentions to initiate and maintain behavioral change (Fleury et al., 1997). This serves as an indicator of individual readiness to initiate change and requires a plan of action and specific strategies for goal achievement. Identifying barriers to change and making a strong commitment to change facilitates goal achievement (Fleury, 1991).

The final dimension of the theory is action, which encompasses contextual influences and the behavioral change processes. Action includes behaviors enacted to modify risk factors and the actual reduction of those risk factors.

Literature Review

Contextual Factors

Research supports the importance of biological, psychosocial, relational, and cultural factors in influencing lifestyle practices (Toobert et al., 1998). In a review of the physical activity literature, Marcus and colleagues (2000) summarized the statistics and reported that sedentary behavior is more prevalent for women, older adults, the less educated, the poor, and ethnic minorities. People with disabilities and chronic illness are also less likely than those without disabilities to report regular moderate physical activity. Moreover, findings from the Women and Physical Activity Survey, part of the Women's Cardiovascular Health Network Project, identified that personal, social, environmental, cultural, and physical environmental factors were strongly associated with physical activity status among a diverse group of women (Eylar, Mattson-Koffman, Young, Wilcox, Wilbur, Thompson, et al., 2003).

Age

The prevalence of women's physical inactivity increases with advancing age (USDHHS, 2000). In 2000 the USDHHS reported that only 15.2% of women between the ages of 25 and 64 reported engaging in light or moderate leisure-time physical activity. Moreover, women identified age as a barrier to the initiation or maintenance of physical activity (Lieberman, Meana, & Stewart, 1998; Mosca, et al., 1998).

Age is a variable consistently included in studies as part of the sample description; but age also has been evaluated as a predictor variable for varying levels of physical activity. Age predicted physical activity behaviors in a group of studies (Cloutier Laffery, 2000; Marchionni, Fattirolli, Fumagalli, Oldridge, Del Lungo, Bonechi, et al., 2000; Mo-Kyung, Sanderson, Weaver, Giger, Pemberton & Klapow, 2004; Yates, Price-Fowlkes, & Agrawal, 2003). Another group of studies indicated age was not directly predictive of physical activity behaviors, but indirectly predicted activity through goal strategies (Conn, Burks, Pomeroy, Ulrich, &, Cochran, 2003) and through self-efficacy and outcome expectancies (Resnick, Palmer, Jenkins, & Spellbring, 2000). Findings with younger women have been less consistent. In a large, multi-state, multi-site cohort, age was not consistently related to physical activity across all the groups, with women in only three of seven sites reporting higher levels of activity compared to older women (Eylar et al., 2003). In this sample the women's ages ranged between 20 and 50 years, describing a younger group than those described in the studies that found age to be predictive of physical activity. For example, Marchionni and colleagues (2000) found that decrements in physical activity were associated with increasing age. Thus, these studies fail to provide consistent support for the influence of age on physical activity.

Health status

The physical capacity to engage in a more physically active lifestyle is a necessary component of the health behavior change process. In individuals with CHD, physical capacity may be characterized by disease-related factors such as cardiovascular function, risk factors for CHD, and associated comorbidities (Fleury et al., 1997). Studies of secondary prevention in cardiac patients revealed that about 20% to 30% of participant noncompliance resulted from medical contraindications such as a high cardiovascular risk profile and excess body weight (Blair, Horton, Leon, Lee, Drinkwater, Dishman et al., 1998). Several large scale studies reported the influence of physical capacity on physical activity. Data from the Framingham Disability Study suggested that CHD was a major predictor of activity limitations with women reporting more disability than men (Pinsky, Jette, Branch, Kannel, & Feinleib, 1990). Other studies with women have identified additional limitations of physical capacity including more comorbidities (Ades, Waldmann, Polk, & Coflesky, 1992), more cardiac risk factors (Cannistra, Balady, O'Malley, Weiner, & Ryan, 1992), and troubling cardiac symptoms (Kimble, 2001).

In a study of particular relevance to women with CHD, Kimble (2001) described the impact of cardiac symptoms on perceived ability to perform household tasks. Women in this study perceived significant limitations on their ability to engage in usual household tasks because of cardiac symptoms. These perceptions persisted even when there had not been a recent cardiac event. The performance of household tasks is considered a moderate level activity within lifestyle activity parameters (Healthy People 2010), but women reported having difficulty with this very familiar and basic level of activity. This finding suggests that the inclusion of more vigorous physical activity, usually involved with a structured exercise

program, may not be perceived as desirable or feasible, and may account for the large number of women remaining sedentary after a cardiac event.

Quantitative studies evaluating the extent to which health status predicts physical activity provide consistent support. Baseline health status has been positively correlated with physical activity (Mo-Kyung et al., 2004), while health status was predictive of a variety of physical activity behaviors when health was perceived as good (Eylar et al., 2003) and as very good or excellent (Ainsworth Wilcox, Thompson, Richter, & Henderson, 2003). When compared to women reporting poor health, women who viewed themselves as healthy reported increased activity levels (Eylar et al.). These findings provide support for the proposition in social cognitive theory that perceived health status plays an important function because self-referent thought strongly influences behavior (Bandura, 1990).

Emotional distress

The concept of emotional distress appears incongruent with the dimension of biological factors. However, the wellness motivation theory assumes a holistic perspective in which physical and psychological well-being are both requisite for health behavior change (Fleury et al., 1997). Emotional distress has been associated with decreased participation in risk modification programs (Haskell et al., 1994; Ladwig, Breithardt, Budde, & Borggrefe, 1994; Mosca et al., 1998), decreased activity patterns (Conn, et al., 1991; Riegel & Gocka, 1995), and decreased cardio-respiratory fitness (Hollenberg, Haight, & Tager, 2003). Depression and anxiety predicted poorer compliance with suggested lifestyle changes in a large scale study of the relationship between anxiety and depression and a variety of outcomes following an MI (Mayou, Gill, Thompson et al. 2000). Qualitative findings suggest that emotional

distress in women may be associated with feelings of anger at themselves, and guilt at having "caused" the cardiac event (Fleury, Sedikides, & Lunsford, 2001).

In a telephone survey of women with self-reported CHD, 57 % of the respondents reported experiencing symptoms of anxiety and depression since being diagnosed with CHD, and more than 85% reported noncompliance with recommended lifestyle modifications (Marcuccio, Loving, Bennett, & Hayes, 2003). Emotional distress has been associated with lower exercise tolerance (Marchionni et al., 2000) and with lower levels of physical activity (Yates et al., 2003) in post-MI patients. Resnick and colleagues (2000) found mood indirectly influenced exercise behaviors through self-efficacy. Hollenberg et al. (2003) followed a group of women over four years and described the exercise capacities and characteristics of depressed women and the effects of depression on cardiovascular risks. Women classified as depressed demonstrated more risk factors for CHD and had lower measures of exercise capacity, cardio-respiratory fitness, and leisure activity, and higher drop out rates between baseline and four years. This persisted even after accounting for age and a previous diagnosis of CHD. Moreover, women reporting depressive symptoms while on antidepressant medication evidenced the worst results in all measures.

Behavior Change Processes

Self- knowledge

Research on the concept of self-efficacy, the belief in one's ability to undertake and accomplish a specific task, and to overcome barriers to accomplishing the task, has shown self-efficacy to be a potent aspect of self-knowledge. In two meta-analyses of self-efficacy research (Gillis, 1993; Holden, 1991) the authors concluded that perceptions of self-efficacy consistently mediated behavior change and functioned as predictors of lifestyle change and

maintenance. In a review of determinants of physical activity behavior, research indicated that, among the psychological correlates of physical activity, self-efficacy was the strongest and most consistent predictor of physical activity behaviors (Sherwood & Jeffery, 2000).

Self-efficacy has been shown to increase over time for women and men when they were presented with the need to undertake a task or accomplish a goal (Gardner, McConnell, Klinger, Herman, Hauck, & Laubach., 2003). In comparison to men, women evidenced lower initial scores on self-efficacy scales, but then had improvements that were comparable to, or greater, than improvements seen in men's scores (Carroll, 1995). Eylar and colleagues (2003) found that women who reported being very self-confident in their ability to exercise were up to five times more likely to be active or to meet physical activity recommendations than women reporting low self-confidence, and the personal correlate of exercise self-efficacy was most consistently and strongly associated with physical activity status.

Self-efficacy theory has provided the theoretical basis for lifestyle interventions directed at modifying risk factors for CHD. Furthermore, self-efficacy has been studied as a predictor of health behaviors related to lifestyle changes for secondary prevention of CHD, including increased physical activity and dietary modifications. However, self-efficacy has not been studied extensively in relation to lifestyle change behaviors in women with CHD.

Special interventions (SI) based on Social Cognitive Theory and Self-efficacy Theory (Bandura, 1986) provide consistent support for the influence of self-efficacy on behaviors associated with lifestyle changes, indicating that increased self-efficacy for a specific behavior is associated with an increased performance of the behavior. Significant treatment effects were found in samples of cardiac surgery patients for increased general activities (Gortner & Jenkins, 1990), increased walking behavior (Gillis et al., 1993), and increased

walking and general activities (Parent & Fortin, 2000). Further support for self-efficacy as a predictor of physical activity, specifically exercise behaviors, was provided by the results of these experimental studies. Self-efficacy predicted exercise behaviors in female cardiac surgery patients (Allen, 1996), in men and women cardiac surgery patients (Gillis et al.; Gortner & Jenkins), and in first time cardiac rehabilitation patients (Carlson et al., 2001), and the participants experienced beliefs of enhanced self-efficacy for accomplishing specific behaviors such as walking (Gillis et al., 1993; Gortner & Jenkins, 1990; Parent & Fortin, 2000).

Results of non-experimental studies also provide consistent support for the role of self-efficacy in relation to physical activity behaviors. Clark and Dodge (1999) found that behavior specific self-efficacy predicted older women's perceptions of getting adequate exercise and of accomplishing a six-minute walk. Self-efficacy was significantly correlated with walking behaviors in older adults (Jenkins & Gortner, 1998), and evidenced a direct relationship with exercise behaviors, and an indirect relationship through outcome expectancies (Resnick, et al., 2000). Findings from a similar sample of community dwelling elderly women, indicated that self-efficacy directly affected exercise behaviors (Conn et al., 2003). Conclusions of the experimental and non-experimental studies presented here indicate clear relationships between self-efficacy and the lifestyle change behavior of increased physical activity, supporting the association of higher self-efficacy with increased physical activity behaviors.

While the relationship between self-efficacy and physical activity behaviors is evident, the temporal variations in self-efficacy beliefs and the enactment of these beliefs over time and in relation to physical activity behaviors are less clear. In quasi-experimental studies, self-

efficacy has been shown to increase consistently over time, regardless of experimental or control group assignment (Carlson, et al., 2001; Gillis et al., 1993; Jenkins & Gortner, 1998). Measures of self-efficacy increased between the fourth and twelfth weeks following cardiac surgery, but exhibited a ceiling effect at the subsequent data collection points at weeks 12 and 24 (Gortner & Jenkins, 1990). However, in a later analysis of the same data discussed in the Gortner and Jenkins study, the ceiling effect occurred at the eighth week following cardiac surgery (Gillis et al., 1993), although the discrepancy was not addressed. In a later study by the same investigators, no ceiling effect occurred during a 12 – month long data collection period (Jenkins & Gortner, 1998).

The temporal relationships between self-efficacy and physical activity behaviors also evidence inconsistencies. Self-efficacy measured at 12 weeks predicted physical activity behaviors at 24 weeks (Gillis et al., 1993; Gortner & Jenkins, 1990); in a later study self-efficacy predicted physical activity behaviors at all time points (Jenkins & Gortner, 1998). The most frequent time points measured were 8, 12, and 24 weeks (Allen; 1996; Gillis et al.; Gortner & Jenkins; Jenkins & Gortner). No rationale was presented for these data collection points other than their proximity to CABG. No studies measured self-efficacy between weeks 12 and 24. This break in measurement was consistent across studies, leaving a three-month period in which the temporal activity of self-efficacy has not been described.

Motivation Appraisal

Perceived Barriers and Benefits

Research suggests that regardless of gender, individuals fail to consider CHD to be related to lifestyle choices and personal risks, but rather tend to relate it to stress or other aspects of the environment not within their control (Murray, Manktelow, & Clifford, 2000).

Consequently, these beliefs affect decisions about CR attendance, the initiation and maintenance of a more physically active lifestyle, and compliance with prescribed regimens and other lifestyle changes (Cooper, Lloyd, Weinmen, & Jackson, 1999; Miller et al., 1989; Missik, 1999; Murray et al.; Oliver-McNeil & Artinian, 2002). Two studies examined the disparities between personal beliefs concerning risk factors for CHD and documented risk factors for CHD. When questioned about risk factors and the lifestyle changes prescribed for treating CHD, first time MI patients and their informal and formal caregivers, participating in small groups to explore social and cultural influences on perceptions of CHD, identified stress, not risky lifestyle behaviors, as the cause of CHD (Murray et al., 2000). Most of the patient sample was overweight, but no one identified diet as a risk factor. However, when queried about needed lifestyle changes, participants identified the appropriate health behavior changes for their individual risk factors. In a second study, a survey of women recently diagnosed with CHD, risk factors documented in the hospital chart were compared to subject responses on a questionnaire about perceived risk factors (Oliver-McNeil & Artinian, 2002). The lists of documented and perceived risk factors differed, with stress topping the list of most frequently perceived risk factors. These findings suggested that the limited awareness or acknowledgement of personal risk factors may indicate a lack of readiness or planning to enact lifestyle changes to prevent further disease progression.

Readiness

The concept of readiness occurs in other theories in addition to the wellness motivation theory. Readiness is well described and occupies central importance in the transtheoretical model (Prochaska & DiClemente, 1983). Readiness is evaluated by determining the stage of behavioral change, and each stage of readiness indicates a different level of motivation.

Motivation promotes the development of goal achievement strategies. As women recovered from a cardiac event and adjusted to a changed view of the self, they began to discover personal strengths that helped them identify relevant goals for health behavior change (Fleury et al., 2001). Goal identification led to an enhanced sense of readiness for initiating and sustaining the health behavior changes.

In a cohort of older women, having more completely developed goal strategies demonstrated a strong direct relationship to behavioral change and marked progression through the stages of change (Conn, Burks, et al., 2003). Findings from another study with older women revealed the major predictor of physical inactivity to be lack of commitment (Conn, Tripp-Reimer, et al., 2003), implying a lack of motivation, goal setting, and readiness. Readiness predicted the initiation of exercise behavior in a cohort of older women participating in a clinical trial of exercise for osteoporosis prevention, and accounted for 45% of the variance, combined with social support, for exercise (Litt, Kleppinger, & Judge, 2002). Mexican-American women, interviewed about their physical activity behaviors, reported lower levels of self-efficacy during the early stages of readiness, while African- American women reported higher levels of self-efficacy with higher stages of readiness (Walcott-McQuigg & Prohaska, 2001), supporting the proposition in Social Cognitive Theory that self-efficacy increases with performance experience (Bandura, 1989).

Collectively these studies provide important information and directions for future inquiry. However, limitations included issues with sampling, design, and measurement. Sampling concerns include self-selection into the sample (Marcuccio et al., 2003), creating a lack of objective validation of the study inclusion criteria, and possibly limiting the validity of the sample's representativeness. Samples of well-educated, motivated adults recruited through

media advertising and at senior centers (Conn, Burks et al; Conn, Tripp-Reimer et al.; Litt et al., 2002), again limited generalizability of findings. The characteristics of highly motivated volunteers could lead to the measurement of behavioral artifacts resulting in systematic error (Morgan, 1997). Three studies enrolled samples from multiple states and multiple sites (Ainsworth et al., 2003; Eylar et al., Marcuccio et al., 2003), providing greater ethnic and racial diversity, and thus greater generalizability. However, these studies looked at younger, well women between 20 and 50 years, limiting generalizability to older women with chronic diseases. Small sample size may have contributed to the lack of significant findings in a study of women newly diagnosed with CHD (Oliver-McNeill & Artinian, 2002), and women constituted only a small percentage to the study samples that included men (Marchionni et al., 2000; Mo-Kyung et al., 2003; Yates et al., 2003). Additionally, the samples recruited from patient populations were composed predominantly of cardiac surgery patients (Allen, 1996; Carroll, 1995; Gillis et al., 1993; Gortner & Jenkins, 1990; Jenkins & Gortner, 1998; Parent & Fortin, 2000), with no samples composed of patients recovering from MI. Thus, more information is needed about the processes involved in women's early efforts at lifestyle adjustment following an MI.

Although these studies are often conducted prospectively, investigators have most often used cross-sectional, correlational study designs (Blanchard et al., 2001; Cloutier Laffery, 2000; Conn, Burks et al, 2003; Conn, Tripp-Reimer et al., 2003; Hellman, 1997; Mosca et al., 1998; Oliver-McNeil & Artinian, 2002). In the two studies with longitudinal, repeated measures designs, one was conducted retrospectively as a secondary analysis of data (Mo-Kyung et al., 2004); and in the other was designed to collect data only every two years (Hollenberg et al., 2003). The extended intervals between data collection points may partially

account for the almost 50% sample attrition. Several other studies did not specify whether initiation or adherence behaviors were being studied (Allen, 1996; Resnick et al., 2000).

The most frequent methodological concern in this group of studies is the inconsistencies in definitions of key concepts and variables. Health status is variably defined by AACVPR risk stratification (Mo-Kyung et al., 2003), items on the SF12 (Resnick et al., 2000), and positive well-being from the vitality subscale of the SF36 (Yates et al., 2003) making comparisons of the concept of health status between studies difficult.

Self-referent thoughts such as self-efficacy must, obviously, be evaluated through the use of self-report measures. However, in the studies reported here, there is an overwhelming preponderance of mono-method bias (Waltz et al., 1991) with self-report measures for all variables, even those behavioral variables which are amenable to measurement with objective instruments. With the exceptions of exercise behaviors measured by 20 minutes of actual aerobic exercise (Resnick et al, 2000), and a 6-minute walk (Clark & Dodge, 1999), all other exercise behaviors were obtained through self-report measures. The Jenkins' Activity checklist was the self-report instrument used in five studies (Carroll, 1995; Gillis et al., 1993; Gortner & Jenkins, 1990; Jenkins & Gortner, 1998; Parent & Fortin, 2000), providing consistency in the measurement of self-reported activity/ exercise.

Little consensus exists about the conceptual definition of physical activity. Physical activity has a broad range of definitions in these studies, ranging from physical fitness (Hollenberg et al., 2003) to exercise (Conn, Burks et al., 2003), and exercise tolerance (Marchionni et al., 2000), to daily physical activities (Yates et al., 2003), as well as lifestyle activity recommendations (Eylar et al.). Although the term physical activity is a broad concept that incorporates exercise and physical fitness, it is difficult to compare results across

studies, other than in a very general sense, when definitions vary so widely. Moreover, given the limited number of older women participating in vigorous physical activities, consideration should be given to the validity and representativeness of the physical activity definitions and measures chosen to assess this population. Interpretation and synthesis of these study findings is hampered by these persistent measurement limitations. None of the studies combined objective and subjective measures of physical activity. Researchers note there is an urgent need for consistency in the measurement of physical activity behavior so that findings will be more comparable between studies (Marcus, et al., 2000).

There are inconsistencies in defining exercise adherence and differentiating it from the concepts of initiation or adoption. Adherence is defined by the number of Phase II CR sessions attended during the 12 week program (Blanchard et al., 2002), and as exercise behaviors following discharge from a Phase II CR program (Hellman, 1997). Clearly, the time parameters for these definitions of adherence differ and do not capture the same patterns. This results in confusion about the stage of behavior being measured across studies. Behavior change occurs in two stages, the initiation or adoption stage and the adherence or maintenance stage, with maintenance or adherence behavior occurring six months after the initiation of a behavior (Marcus et al., 2000). Since these represent distinct aspects of the behavior change process it is important that definitions be consistent across studies.

The most significant measurement issue is the limited assessment of process during the initiation of lifestyle changes, particularly the temporal relationships of self-efficacy and outcome expectancies to lifestyle change behaviors (Allen, 1996; Resnick et al., 2000). Even in those studies that employed repeated measures, longitudinal designs, temporal relationships and process were unexplored in any study during weeks 12 through 24.

In summary, empirical evidence from quantitative and qualitative research supports the role of psychosocial factors in relation to self-efficacy and health behavior change. Moreover, research supports the influences of self-efficacy and the importance of having goal strategies to facilitate readiness for health behavior change. These factors have predicted physical activity behaviors and demonstrated direct and indirect influences. However, the studies have not moved knowledge beyond the predictive ability of these factors to the interaction of these factors with behavioral change processes to determine behavioral outcomes.

In this study, we have attempted to address the limitations represented in the literature analyzed above by providing consistent definitions of the concepts, evaluating process, and measuring variables prospectively and, when appropriate, with subjective and objective measures. The purpose of this research therefore is to describe and explore the physical, psychosocial, and behavioral factors involved with initiating a more physically active lifestyle as they change over time during participation in a formal, Phase II program of CR. The research questions are:

1) What are the typical patterns of change women experience in contextual influences, behavior change processes, and physical activity during the 12 weeks of CR participation?
2) How stable, or dynamic, over time are contextual influences, behavior change processes, and levels of physical activity?
3) How linear are individual trajectories of change over 12 weeks?

4) When subjects are grouped by high or low emotional distress, high or low subjective health status, high or low objective health status, high or low self-efficacy, high or low goal setting, and high or low barrier efficacy:

a) Which groups adopt higher levels of physical activity?

b) Do groups differ in their patterns of initiating increased physical activity?

5) When subjects are grouped by levels of physical activity, do the groups differ in the temporal patterns of contextual influences or behavioral change processes?

Methods

Study Design

The study used a descriptive, exploratory single group repeated measures design with data collected at baseline, four, eight, and twelve weeks during participation in a Phase II cardiac rehabilitation program. These time points were chosen to minimize respondent burden while obtaining frequent enough measurements to characterize the process of health behavior change during the three month period of the formal program..

Sample and Setting

Women were eligible for participation if they had experienced a cardiac event, defined as an MI, CABG, or PTCA, or receiving a diagnosis of stable angina; being newly enrolled in one of two CR programs in central North Carolina; able to speak and read English, hear and respond to questions, give informed consent, follow instructions over the four data collection points, and have a MET level above 4.5. Newly enrolled was defined as having participated in fewer than five exercise sessions within the first two weeks of CR, and having never been previously enrolled in a program of CR.

Measurement of Variables

Demographic and Medical Variables

Age was assessed in calendar years. Participants were asked to provide their chronological age as of their last birthday. Subjective health status was obtained through the self-report of comorbidities. Other demographic information, obtained from the medical record and self-report, included medications, prior level of physical activity, and cardiac history. Additional information obtained from the patient chart included a MET level based on the Graded Exercise Test, documented cardiac risk factors, and body mass index (BMI).

Socioeconomic Status

Socioeconomic status (SES) was assessed by asking about financial, educational, occupational, and partnered status. Financial status data were recorded as annual household income in $5000.00 increments. Past and present occupations were asked as open-ended questions, and used as descriptive data to characterize the sample. Education was recorded as the highest number of years of completed schooling. In addition to partnered status, the demographic questionnaire inquired about the number of household residents and dependents

Emotional Distress

The Profile of Mood States Short Form (POMS-SF) was used as a measure of emotional distress (Shacham, 1983). The POMS-SF is a 30-item self-report instrument with 6 subscales to assess the mood disturbances of anger-hostility, tension-anxiety, depression, vigor-activity, fatigue-inertia, and confusion. Respondents rate words associated with the mood states on a 5-point Likert-type scale with choices ranging from “not at all” (0) to “extremely” (4). Higher scores are associated with greater emotional distress. A total score is obtained by summing five of the subscales and subtracting the vigor subscale resulting in a range of

scores from -24 to 96. The 6 POMS-SF domains may also be scored as individual subscales. The POMS-SF has been shown to be a reliable instrument for assessing general symptoms of emotional distress while being able to track changes in the levels of emotional distress as the levels vary over time.

Self-efficacy

Self-efficacy for walking was measured with the Jenkins Self-Efficacy Expectations for Walking Scale. This is an independent scale designed for the purpose of making the concept of self-efficacy expectations measurable across a group of behaviors relevant to recovery from a cardiac event (Jenkins, 1989). Instrument development was guided by self-efficacy theory. In accord with the changes in prescribed treatment and activity protocols post cardiac event, the walking scale was revised and extended to encompass activity levels relevant up to six months after cardiac event. These revisions for walking behaviors make the scale a valid measure for individuals recovering from cardiac surgery and also for those participating in a Phase II CR program. The scales may be administered as paper and pencil measures, but can also be used in an interview format if desired. Each behavior scale is independent. The scale for walking contains 15 questions that measure the perceived level of confidence for walking various distances, ranging from a minimum distance of walking from bed to bathroom to a maximum of walking 30 blocks, or 3 miles. The scale measures the confidence the individual feels for performing a specific behavior at the very moment of assessment. Nursing studies frequently use the Jenkins Self-Efficacy Expectations Scale for Walking to measure confidence for walking.

The Jenkins Self-efficacy Expectations Scale for General Activities contains 17 items that assess perceived level of confidence to accomplish tasks as fundamental as brushing teeth to

as complex and demanding as resuming previous activities. Each scale is a measure of the confidence the individual feels for performing a specific behavior at the very moment of assessment.

The Jenkins Activity Check-Lists for Walking and for General Activities were developed to complement the Jenkins Self-Efficacy Expectation Scales for Walking and General Activities (Jenkins, 1989) and to corroborate the Self-Efficacy Expectations Scales. The Jenkins Activity Check-Lists are designed to assess self-reported performance of a specific activity exactly as it appears on the Self-Efficacy Expectations scale. The Check-Lists are to be administered after the Self-Efficacy Scales, and only are to be applied to the activities of the previous 24-hour period. The efficacy scales and checklists may be used in an interview or questionnaire format. In this study, they were used in the interview and questionnaire format depending on the participants' preferences.

The graded activities for each scale are listed with three columns appearing to the right with response choices of "not applicable," "yes," and "no" for questions that ask the respondent about the occurrence of a specific behavior. For example, the self-efficacy scale asks the respondent to rate the level of confidence in their ability to walk 10 blocks (1 mile), while the activity check-list asks whether the actual behavior has been performed in the last 24 hours. In keeping with theory, performance of a behavior should result in enhanced self-efficacy for performing that behavior (Bandura, 1986). The number of "yes" responses is summed for each scale. Higher total activity scores indicate a higher level of reported physical activity. Reliability and validity data for the Activity Check-Lists are reported with the Self-Efficacy Expectation Scales, since they were designed to be administered concurrently.

In this particular study, the internal consistency estimates for the Jenkins SEE Scale for General Activities over the four time points were low, ranging from a high of .573 to a low of .000 at eight weeks. These low Cronbach's alpha estimates may reflect the lack of variability in the responses to the scale items. The women were confident in their abilities to accomplish these tasks, as most tasks were very basic and the women had moved well beyond having difficulties with these types of activities of daily living. The last question on the scale, which assesses one's confidence to "Return to your normal routine", demonstrated the most variability in responses. The poor internal consistency statistics and the lack of variability in responses limited the utility of this scale for this study. Therefore, the Cronbach's alpha for the Jenkins SEE Scale for General Activities and the Coefficient alpha for the Checklist are reported but the scales are not included in the analysis.

Readiness

Readiness was measured with the Goal Setting Scale developed by Nies, Hepworth, Wallston, and Kershaw (2001) to measure behavioral change in sedentary women. Items were generated by a panel of content and measurement experts based on three constructs identified in behavioral change research as key determinants in the process. Goal setting, restructuring plans, and relapse prevention and maintenance provided an a priori basis for scale development. Items were developed for each construct resulting in a 16-item instrument, with 6 items for goal setting, 4 for restructuring plans, and 6 items tapping relapse prevention and maintenance. Only the six questions comprising the goal setting scale were used as it demonstrates consistent reliability and validity, and the developer has stated that the scales may be used independently without compromising the psychometrics of the instrument (Nies et al., 2001).Respondents are asked to rate the items on a 5-point Likert

scale ranging from “strongly agree” to “strongly disagree” with “neutral” anchoring the middle.

Readiness was also measured with the Barriers Self-Efficacy Scale, a scale designed to address barriers specific self-efficacy with a population of middle-aged adults (McAuley, 1992). The Barriers Self-Efficacy Scale taps subjects' perceived capabilities to exercise in the face of commonly identified barriers to participation. The scale is composed of 13 items for which participants indicate their degree of confidence for overcoming each barrier on a 0% (no confidence at all) to 100% (complete confidence) scale. The confidence scores are summed and divided by the total number of items giving a possible range of 0-100%.
Table 5.1 lists the means, standard deviations, and internal consistency estimates (Cronbach’s alphas) for all interval and ratio level instruments and coefficient alpha for dichotomous scales.

Objective Physical Activity

The Yamax NL-2000 Activity Monitor provided an assessment of objective physical activity. It supplies an estimate of the number of steps walked, the distance walked, the number of total calories expended, and the number of calories burned through activity. The NL-2000 stores step totals and activity calorie totals for seven days.
The internal clock resets totals daily resulting in no need for the study participant to use the reset button every day.

Multiple studies provide support for the use of a Yamax pedometer in physical activity research. A comparison of 10 electronic pedometers, including the Yamax NL-2000, revealed that electronic pedometers accurately assessed steps, less accurately assessed

Table 5.1

POMS Total and Subscales Means (and Standard Deviations) and Cronbach's α by Time

Variable	Mean (SD)				
	T1	T2	T3	T4	Cronbach's α
POMS –SF (Total)	9.2(13.8)	5.0(14.5)	6.4(15.3)	3.5(13.2)	.779 - .808
(Range 0- 96)					
SS1 (anger/hostility)	2.9(2.6)	2.4(2.6)	2.8(4.0)	1.8(1.9)	.742 - .908
(Range 0-20)					
SS2 (tension/anxiety)	4.5(2.7)	3.2(2.3)	2.8(2.8)	2.9(2.8)	.677 - .849
(Range 0-20)					
SS3 (depression)	3.8(3.0)	2.6(2.8)	2.7(3.3)	2.7(2.9)	.718 - .852
(Range 0-20)					
SS4 (vigor/activity)	10.9(4.9)	11.5(5.5)	11.0(4.7)	11.0(4.4)	.867 - .925
(Range 0-24)					

Table 5.1: (*Continued)* Variables Means (and Standard Deviations) by Time

Variable	Mean (SD)				
	T1	T2	T3	T4	Cronbach's α
SS5 (fatigue/inertia) (Range 0-20)	7.5(4.6)	6.7(4.3)	7.3(4.4)	5.7(4.1)	.891 - .899
SS6 (confusion) (Range 0-16)	1.6(1.5)	1.6(1.4)	1.8(1.9)	1.4(1.5)	.509 - .807
Jenkins SEE Walking (Range 0-10)	7.5(2.5)	7.4(2.5)	7.9(2.2)	7.8(2.4)	.944 - .956
Jenkins Checklist for Walking (Range 0-16)	NA	NA	NA	NA	.904 - .944 Coefficient α
Jenkins SEE Activities (Range 0-10)	9.8(.28)	9.8(.22)	9.9(.11)	9.9(.15)	.000 - .573
Jenkins Checklist for Activities (Range 0 – 17)	NA	NA	NA	NA	.770 - .870 Coefficient α

Table 5.1: (*Continued)* Variables Means (and Standard Deviations) by Time

Variable	Mean (SD)				
	T1	T2	T3	T4	Cronbach's α
Goal Setting Scale (Range 6-30)	20.3(6.)	19.7(4.9)	21.0(4.5)	19.7(5.4)	.846 - .911
Barrier Efficacy Scale (Range 0-100)	69.2(22.9)	68.3(22.9)	67.5(19.8)	63.8(22.4)	.927 - .949
Steps	24,459(12,722)	24,964(14,110)	25,368(14,090)	21,568(12,593)	

distance, and did an even less accurate job assessing kilocalories (Crouter, Schneider, Karabulut, & Bassett, 2003). Although some pedometers performed more poorly at slower walking speeds, the NL-2000 demonstrated acceptable accuracy at slower speeds (Crouter et al.). Further evidence of convergent validity was demonstrated in a study comparing three electronic pedometers, including a Yamax model, with an accelerometer (Le Masurier, Lee, & Tudor-Locke, 2004). The authors concluded that the Yamax model was the most consistently accurate pedometer under controlled and free-living conditions.

Procedures for Recruitment and Data Collection

After receiving Institutional Review Board approval, potential study participants were identified by screening incoming female cardiac rehabilitation referrals during attendance at weekly staff meetings at two (CR) facilities. Potential participants meeting inclusion criteria received a flier describing the study, and after completing the first two CR sessions were approached about participating. Informed consent was obtained from those wishing to participate. Participants received $20.00 for each completed round of data collection.

Data were collected by the investigator in a meeting with the participant, using paper and pencil measures completed by the participant or by interview if requested. Five of twenty women requested the interview format. Participants completed a demographic assessment form and a group of psychosocial questionnaires, including the POMS-SF, the Jenkins Self-efficacy Expectations for Walking and General Activities Scales, the Jenkins Activity Checklists for Walking and General Activities, the Goal Setting Scale, and the Barrier Efficacy Scale. Participants also received a Yamax NL-2000 Activity Monitor (pedometer) with instructions for wearing and operating the device. Pedometers were worn daily for four days during waking hours. Activity monitoring was restricted to four, rather than seven, days

to minimize participant burden. Weekend days and the surrounding weekdays were selected to minimize monitoring supervised exercise sessions (Monday, Wednesday, Friday) while better capturing naturally occurring activity levels. This also placed the emphasis on monitoring activity during days with more leisure time activity and the performance of household chores, activities that have been shown to be relevant for older women (Kimble, 2001).

Data Analysis

Data were analyzed using a combination of statistical software packages. SPSS 12.0 was used for between person and scale analyses. Microsoft Office Excel 2003 was used for the within person analysis and for creating the individual level graphs of data. The purpose of this study and this analysis is exploratory in nature. Therefore, the use of inferential statistics and significance levels is for the purposes of a fuller description and for identifying relationships for more complete exploration with a larger sample in future research.

Demographic and other continuous variables are described using measures of central tendency, the mean, standard deviation, and range. Frequency distributions and univariate descriptive statistics are provided for all variables. Variables were examined for normal distribution to identify outliers. It was not necessary to evaluate potential bias in the individual-level measures as there was no participant attrition during the study.

Means, standard deviations, and internal consistency of all interval and ratio level measures were estimated with Cronbach's alpha reliability coefficient (Table 5.1) as reliability is sample specific. Measurement of psychosocial factors and self-referent thinking varies across time. Therefore, test-retest reliability was inappropriate with these measures. Jenkins Checklists for Walking and for General Activities offer a dichotomous response

format of “yes” or “no”. In SPSS dichotomous data are analyzed for internal consistency and reported as Coefficient alpha, which is equivalent to the Kuder-Richardson 20 (KR20) coefficient.

The aim of the study, to describe and explain intra-individual patterns of change in the processes of recovery, specifically in adopting increased levels of physical activity, benefits from visual and statistical techniques to assist with identification of patterns and trends in the data (Verbrugge, Reoma, & Gruber-Baldini, 1994). The analysis for the proposed study is partially based on the techniques employed by Verbrugge and colleagues in which they analyzed patterns of change, looked at individual and group trajectories of change, and studied differentials in trajectories by various characteristics to better understand the dynamics of disability. Additional analysis was conducted using repeated measures analysis of variance (RMANOVA). RMANOVA is particularly appropriate for this data set because of its symmetry with complete data across all four time points and for all individuals. Moreover, RMANOVA allows for the estimation of linear and nonlinear patterns while adjusting for repeated measures with the individual

Intra-individual changes were analyzed by looking for typical patterns of change for the sample, assessing the amount of dynamism experienced by the individual, and evaluating the linearity of changes over time (Verbrugge et al., 1994). To answer the question” What are the typical patterns of change women experience in contextual influences, behavior change processes, and physical activity during the 12 weeks of CR participation?” the analysis involved plotting each variable for each individual. The x-axis represented weeks in CR and standardized scores for each variable are presented on the y-axis. Standardization was accomplished by computing within-subject z-scores using each individual’s mean and

standard deviation. Visual inspection was facilitated by separating the variables into clusters with the POMS and the POMS subscales scores and steps constituting the first cluster. The second cluster included the Jenkins SEE Scale for Walking, the Goal Setting Scale, the Barrier Efficacy Scale and steps. Steps were included with each cluster to facilitate visualization of the influencing factors and the outcome variable. Each of the four data collection points were connected by lines to aid with visual inspection of the trends and not for the purposes of interpolating between time points.

The question, "How stable, or dynamic, over time are contextual influences, behavior change processes, and levels of physical activity?" was analyzed in three ways. First, each individual's plots for each variable were visually inspected for identification of dynamism (Verbrugge et al., 1994). Second, relative standard errors (standard deviation divided by the mean) were computed then compared within and between individuals (Verbrugge et al.). Third, correlations for each variable were computed from one time point to the next.

The question addressing which groups adopt higher levels of physical activity was analyzed by computing an overall mean in which time was ignored and all scores pooled for each variable (Verbrugge et al., 1994). Groups were formed by dividing overall means for each variable into high and low scores. Trajectories of physical activity were grouped by levels, high, medium, and low, and then evaluated by level of emotional distress, subjective health status, objective health status, self-efficacy, goal setting, and barrier efficacy. Significance was set at $p \leq .05$. Physical activity means for each group were computed for all time points, plotted, and visually inspected. Data were analyzed with RMANOVA using time as the within subjects factor and the high/ low groupings and demographic and descriptive variables as between subjects factors with all scales, subscales, and steps analyzed as

outcome variables. Any significant findings were followed up with post hoc pairwise comparisons with Bonferroni adjustment.

Results

Sample Characteristics

A total of 20 women were enrolled from two cardiac rehabilitation facilities in the Southeast, both associated with major medical centers in central North Carolina. Thirteen women (65%) came from one facility and 7 (35%) from the other. Sixty-one women were approached based on prescreening criteria. Seventeen women were excluded, twenty-two declined, and two were missed. The major reasons given for declining participation included 12 citing lack of time (20%), 5 providing care for someone at home (8%), and 5 stating they had no interest in participating (8%). Examination of the demographic variables of age and race indicated that study participants did not differ significantly from those who declined participation. Other potential differences are unknown.

The ages of the final sample of 20 women ranged from 43 to 84 years with a mean age of 67.05 years (*SD* 11.12) and a median age of 69 years. The sample was well educated with nine (45%) reporting a college education and eight (40%) graduate level education. Twelve women (70%) reported being retired, which is not surprising in the context of the women's ages, five (25%) worked full-time, and three (15%) did part-time work. Reported household incomes ranged from the $20,000.00 to $40,000.00 range to the upper end range of $80,000.00 to over $100,000.00. Nine (45%) women reported combined household incomes in this upper category indicating this sample was in a higher socioeconomic group, with above average educational levels and incomes compared to the general population of the United States (U.S. Census Bureau, 2004). Women reported functional limitations such

associated with arthritis (8), cataracts (1), hearing loss (1). One woman, the second youngest, reported no comorbidities, and the youngest woman reported only gastroesophageal reflux disease. The average number of comorbidities, not including CHD risk factors, ranged from one to three. Complete demographic and medical characteristics are presented in Table 5.2. The comparison of demographic and descriptive variables by site is presented in Table 5.3. Perceived and documented risk factors with frequencies are presented in Table 5.4.

The 20 women who agreed to participate in the study remained through all four data collection points. Four (20%) women did not complete the three months of cardiac rehabilitation, but remained with the study. However, they did complete at least six of the twelve weeks of rehabilitation. The age range for this group of women varied from 43 to 84 years, inclusive of the youngest and oldest participants. Half were employed full time and the other half retired. Reasons for withdrawing from rehabilitation included interference with work (2), unable to make the time commitment (1), and personal activity goals not being met through the rehabilitation program (1). The completion and drop out groups were similar on measures of demographic and descriptive variables. However, there were some differences in the measurement of process variables, including a small but significant difference ($p= 0.016$) in the confusion subscale of the POMS (POMS SS6). The women who dropped out of CR had higher initial confusion scores. Self-efficacy scores at baseline were significantly different ($p=0.03$) between women who completed and those who did not complete CR, but did not differ at subsequent measurement intervals. Women who dropped out had low levels of self-efficacy at baseline but increased steadily across the remaining time points, while the women who remained in CR started at a higher level, but demonstrated little change over time. Barrier efficacy scores were significantly different ($p=0.007$) between those women

Table 5.2

Demographic and Medical Characteristics of the Sample (N=20)

Variables	n (%)
Age, years	
43 - 56	5 (20%)
64 - 67	5 (20%)
71 – 75	5 (20%)
77 – 84	5 (20%)
Partnered status	
Married	14 (70%)
Divorced	5 (25%)
Widowed	1 (5%)
Ethnicity	
Caucasian	18 (90%)
African American	2 (10%)
Education	
High School	3 (15%)
College	10 (50%)
Graduate School	7 (35%)
Household Income	
$20,000 – 40,000	5 (25%)
$40,001 – 60,000	4 (20%)
$60,001 – 80,000	2 (10%)

$80,001 – 100,000	5 (25%)
> $100,000	4 (20%)
Employed	
Full time	5 (25%)
Part time	3 (15%)
Retired	12 (60%)
Prior physical activity	
None	4 (20%)
Occasional	6 (30%)
Regular	10 (50%)
Cardiac Event	
MI/angioplasty/stent	5 (25%)
MI/angioplasty	3 (15%)
Sx/angioplasty/stent	5 (25%)
CABG	3 (15%)
MI	1 (5%)
Stable angina	1 (5%)
Multiple procedures	2 (10%)
Medications	
Beta blockers	16 (80%)
Statins	16 (80%)
Antidepressants	4 (20%)
Thyroid replacement	7 (35%)

Table 5.3:

Comparison of Sites on Demographic and Descriptive Variables

Variables (Mean) (*SD*)	Site 1	Site 2
Age	70.08 (11.3)	61.43 (8.9)
Days from CE to CR	69.69 (36.5)	47.29 (34.6)
Days in Hospital	6.08 (6.9)	3.57 (2.9)
Partnered status		
Married	10 (50%)	4 (20%)
Divorced	3 (15%)	2 (10%)
Widowed	0	1 (5%)
Ethnicity		
Caucasian	11 (55%)	7 (35%)
African American	2 (10%)	0
Education		
High School	2 (10%)	1 (5%)
College	5 (25%)	5 (25%)
Graduate School	6 (30%)	1 (5%)
Household Income		
$20,000 – 40,000	3 (15%)	2 (10%)
$40,001 – 60,000	3 (15%)	1 (5%)
$60,001 – 80,000	2 (10%)	0
$80,001 – 100,000	2 (10%)	3 (15%)
> $100,000	3 (15%)	1 (5%)

Table 5.3 (C*ontinued)* Comparison of Sites on Demographic and Descriptive Variables

Variables (Mean) (*SD*)	Site 1	Site 2
Employed		
Full time	3 (15%)	2 (10%)
Part time	1 (5%)	2 (10%)
Retired	9 (45%)	3 (15%)
Prior physical activity		
None	3 (15%)	1 (5%)
Occasional	2 (10%)	4(20%)
Regular	8 (40%)	2 (10%)

Table 5.4

Cardiovascular Risk Factors

Risk Factor	Documented	Stated
Elevated lipids	12 (60%)	3 (15%)
Hypertension	12 (60%)	2 (10%)
Physical inactivity	3 (15%)	2 (10%)
Obesity	3 (15%)	2 (10%)
Smoking		
History	2 (10%)	0
Current	3 (15%)	2 (10%)
Diabetes	3 (15%)	1 (5%)
Metabolic syndrome	2 (10%)	1 (5%)
Family history/ Genetics	2 (10%)	6 (30%)
Sleep apnea	1 (5%)	1 (5%)
Stress	0	3 (15%)
Age	1 (5%)	1 (5%)

who dropped out and those who completed CR, with completers scoring consistently higher across all four time points; both groups scored lower at week 12.

The types of cardiac events that had been experienced by the women in the study included cardiac symptoms or a myocardial infarction (MI) followed by radiological intervention and MI or cardiac symptoms followed by coronary artery bypass grafting (CABG) (Table 5.2). Two of the women that underwent a CABG procedure reported complications that included bleeding complications, graft closures, and stent placements. One woman was diagnosed with atypical chest pain and stable angina. The number of days in the hospital ranged from 1 day to 26 days with an average of 4.8 days (*SD* 5.9). The length of time between the cardiac event and the beginning of CR ranged from 15 to 146 days, with a mean of 60.85 days (*SD* 36.59) and a median of 44 days.

Independent samples t-tests were conducted to compare the study sites for differences in demographic and descriptive variables, with no significant differences found. Although the difference in age between sites was not statistically significant, the means were separated by 8.5 years.

Process and outcome variables were analyzed using RMANOVA with time as the within subjects factor and site as the between subjects factor. The seven participants at the second CR facility recorded a significantly higher ($p=0.028$) mean number of steps at baseline, four weeks, and eight weeks, as well as significantly ($p=0.026$) higher goal setting at four and eight weeks. The younger ages of the sample at the second facility may account for the increased level of physical activity.

The sample's scores on the POMS-SF were compared to a population of recovering cardiac surgery patients (Gillis et al., 1993) using a single sample t-test. Women in this

sample had significantly lower subscale and total emotional distress scores with the exceptions of the scores on the anger subscale (SS1) at all four time points and the fatigue subscale (SS5) at all time points except week 12. Scores on the Jenkins' Self-efficacy Expectations for Walking Scale were compared to scores from a group of elders with a cardiac diagnosis (Jenkins & Gortner, 1998) and no differences were found. Scores on the Goal Setting Scale (Nies et al., 2000) and the Barriers Self-efficacy Scale (Conn, 1998) were compared to similar samples. Goal setting was found to be significantly lower ($p=0.007$) at 8 weeks and barrier efficacy was significantly lower ($p=0.044$) at 12 weeks. When the number of steps averaged over four days were compared to the recommended number of steps per day (10,000 steps) this sample consistently recorded fewer steps over the four time points ($p<0.0001$). Women stated their outcome expectancies were to return to previous activities.

Changes in Contextual Factors, Behavior Change Processes, and Action

Conducting individual level analysis involved finding typical patterns of change, assessing the amount of dynamism experienced by the individual, and assessing the linearity of change over the 12 weeks of CR participation.

Typical patterns of change

What are the typical patterns of change women experience in contextual influences, behavior change processes, and physical activity during the 12 weeks of CR participation?

The five scales, number of steps, and the six subscales of the POMS were plotted for each subject and presented as a single picture. The measures were separated into two pictures with the total POMS and six subscales displayed with steps on one picture and the self-efficacy, goal setting, and barrier efficacy scales displayed with steps on the second picture. Each time point was connected with a line indicating contiguous measurement. This was done for each

variable. Each of the 40 plots was visually inspected for patterns of change and visual characteristics. Several themes emerged from the visual inspection.

There were five distinct patterns of change for the physical activity outcome of steps (Figures 5.1 -5.5). A group of four women demonstrated an increase in activity between weeks four, eight, and twelve or between weeks eight and twelve. The importance of this is the fact that these are the only women to demonstrate an increase in activity during this time period, rather than a decrease, as evidenced by the other sixteen study participants. The second pattern, demonstrated by six women, indicated a steady increase in activity from baseline to week eight, with a sharp drop in activity at week twelve. Five women displayed the third pattern in which their activity levels steadily declined from week 4 to week twelve. In the fourth example four women demonstrated a hectic pattern with a decrease in activity at week four, an increase at week eight, and another decrease at week twelve. The fifth pattern belonged to one woman, her activity declined linearly from the baseline measure to week twelve. She also had the highest number of and most serious comorbidities and later died from complications related to end stage renal disease.

According to the propositions of social cognitive theory (Bandura, 1986), with continued CR participation self-efficacy for walking should increase with maintenance or increased walking behaviors. On a graphical display this should show as a rising line for self-efficacy for walking as the line indicative of walking remains stable or increases. The other possible pattern would be an increase of SEW concurrent with each increase in walking. Twelve women had disparities between the level of self-efficacy and walking behaviors, with self-efficacy exceeding activity levels. This was most evident at weeks eight and twelve. Four women rated themselves as 100% confident they could successfully walk increasing

Figure 5.1

Activity Pattern 1

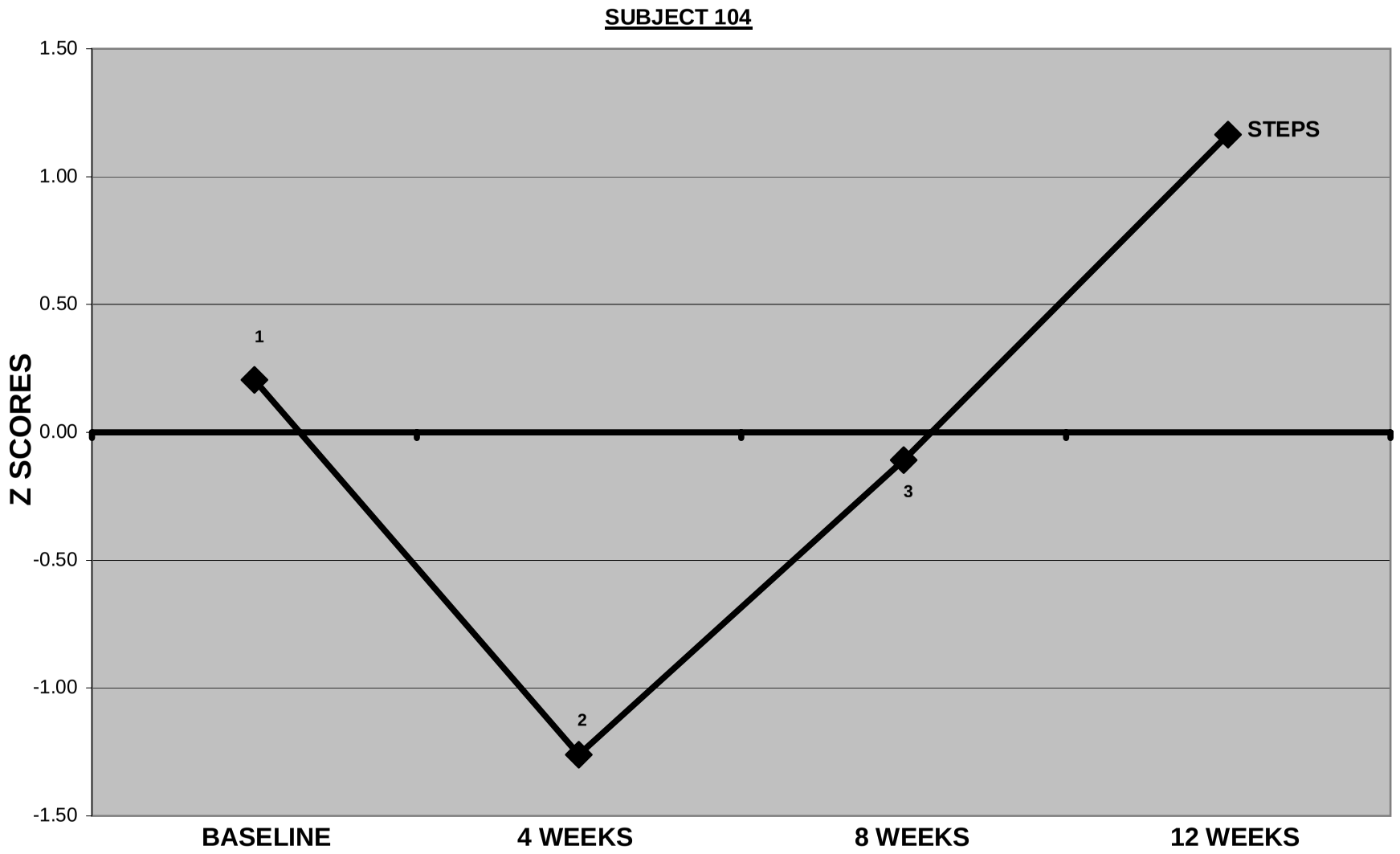


Figure 5.2

Activity Pattern 2

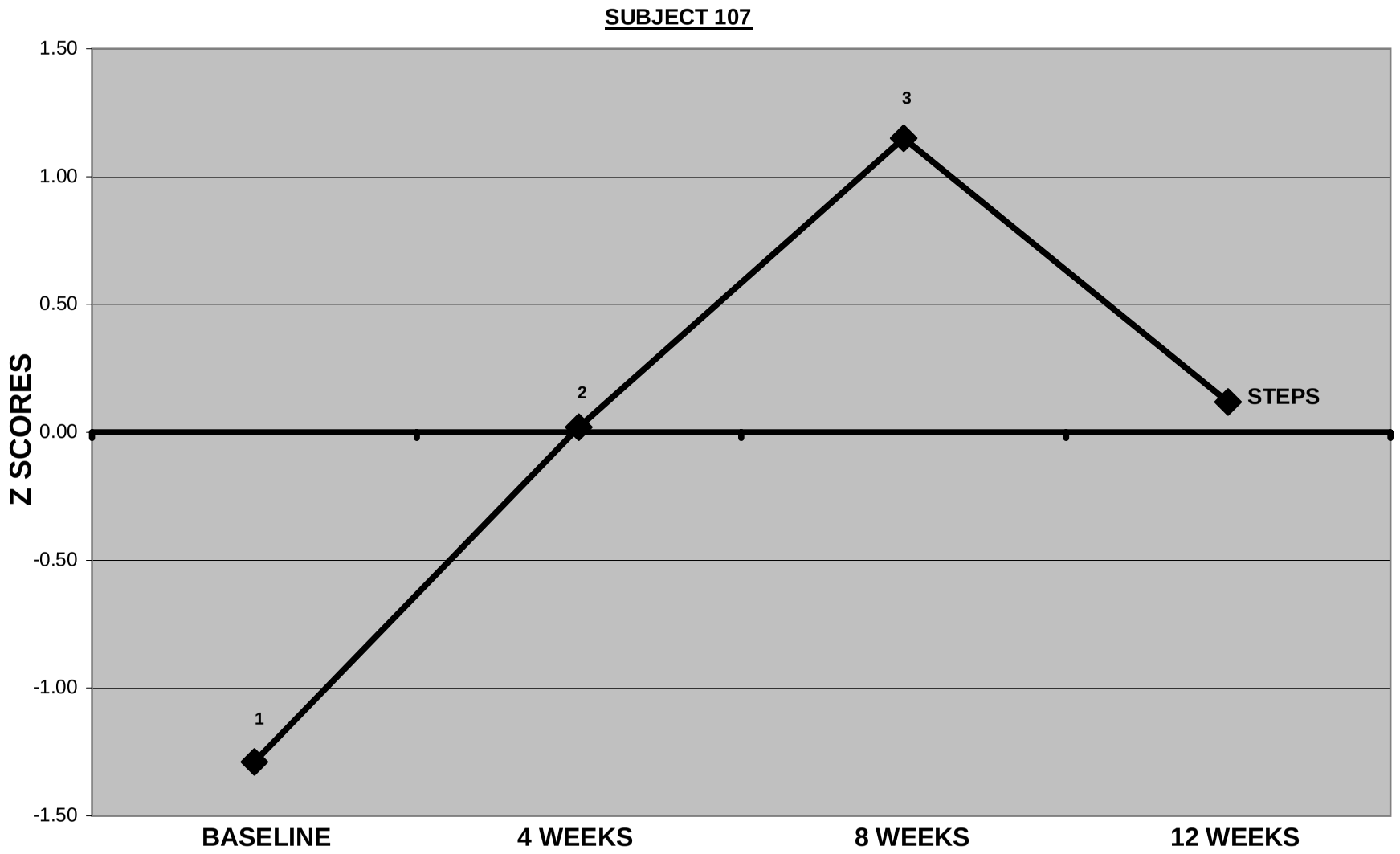


Figure 5.3

Activity Pattern 3

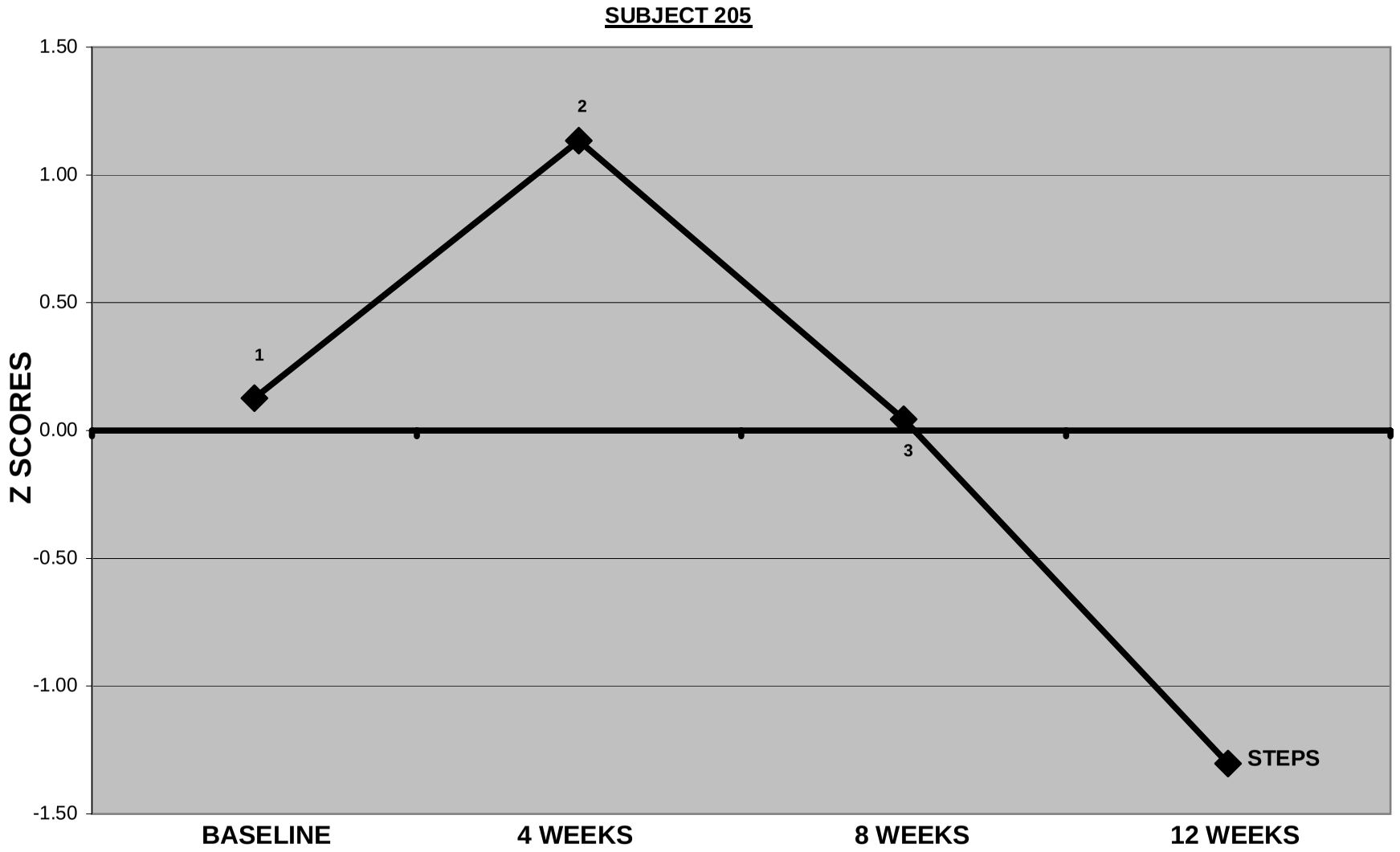


Figure 5.4

Activity Pattern 4

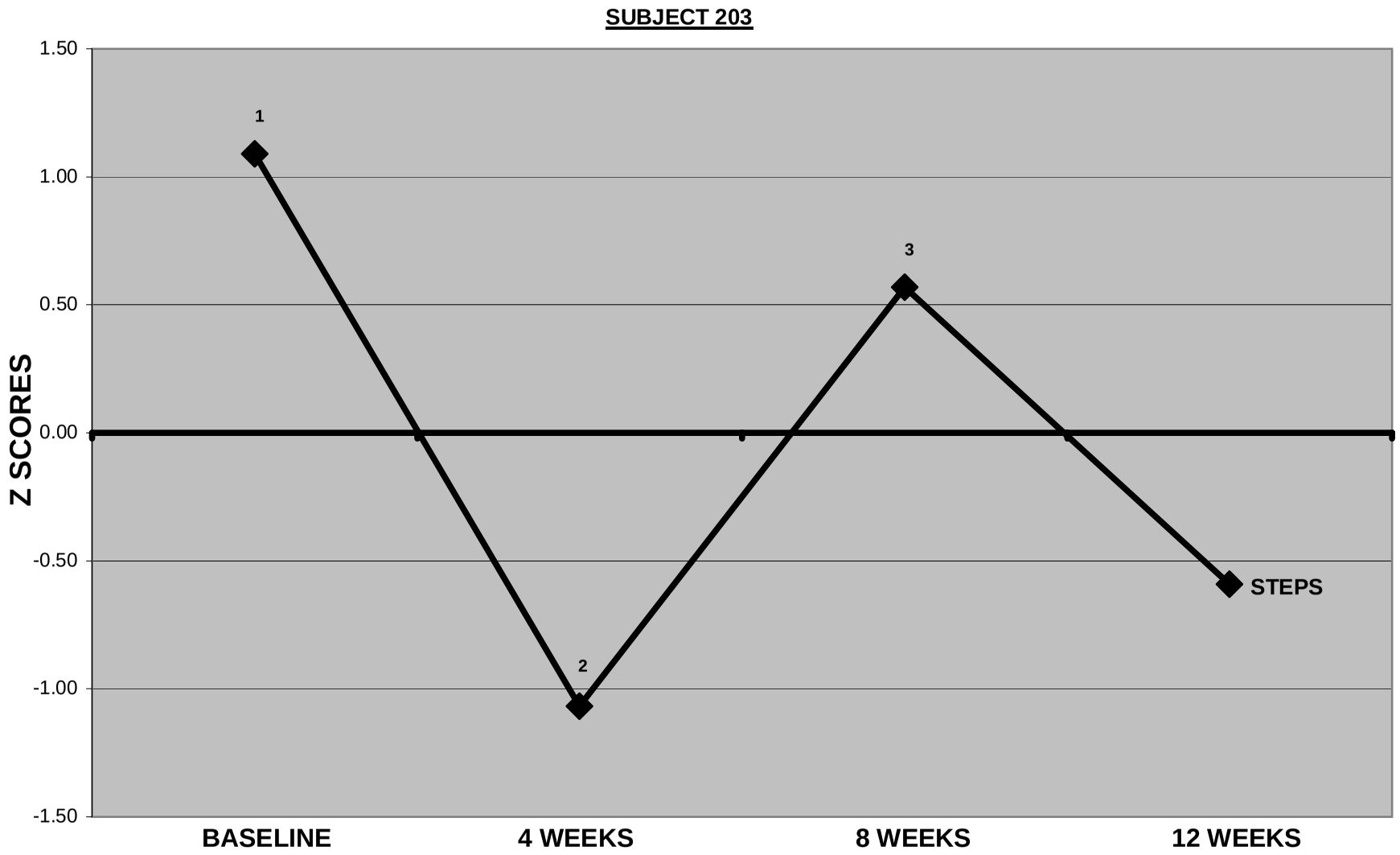
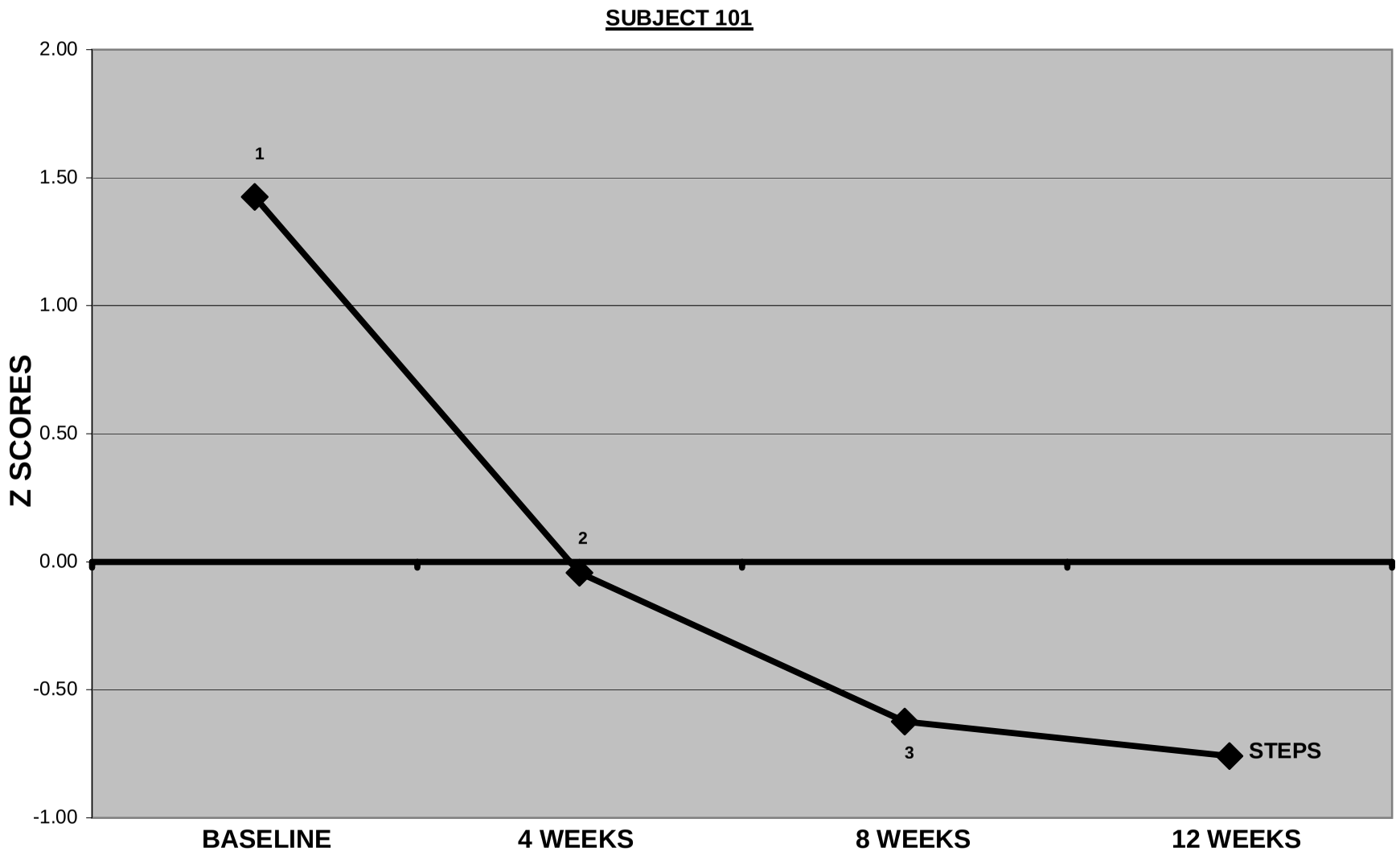


Figure 5.5

Activity Pattern 5



distances over all four time points. Two of these women evidenced linear increases in activity over three time points, while the other two women's activity patterns were erratic. Four women had no clear pattern of relationships between self-efficacy and walking behaviors.

The expected pattern between the vigor (SS4) and the fatigue (SS5) subscales of the POMS would be displayed as a negative relationship, in which as vigor increases, fatigue decreases, or as fatigue increases, vigor decreases. All 20 women displayed this pattern, but not in a linear fashion. Vigor and fatigue subscale scores dropped, rebounded, and crossed each other, indicating that these states were very fluid and changeable. There were no consistent or predominate patterns of change in the behavioral change variables of barrier efficacy and goal setting.

There was a distinct pattern in the activity variable of steps. There was a large, though not statistically significant ($p=0.053$), decrease in steps from four weeks to twelve weeks. Six women reduced their activity from weeks 4 to 8, with a continued reduction at week 12. Ten maintained a higher activity level until a decrease between weeks 8 and 12. Only four women had stable or increased activity levels at weeks 8 and 12. In the analysis of the data by groups, physical activity was grouped by these patterns and used as the between subjects factor in RMANOVA, with time as the within subjects factor and steps, contextual factors, and behavior change processes as the outcome variables. There were no significant group differences found for any of the measures.

Additional statistical analysis revealed a pattern of activity related to the type of day being monitored. Using paired sample t-tests the numbers of steps for each day monitored with the pedometer were compared. The CR participation day had significantly more steps recorded

compared with the non-rehabilitation weekday ($p=0.007$) and with Sunday ($p<0.0001$), but not with Saturday. Sunday remained the least active day with significantly fewer recorded steps compared with the non-rehabilitation weekday ($p=0.04$).

Individual dynamics. How stable, or dynamic, over time are contextual influences, behavior change processes, and levels of physical activity? This question was evaluated both visually by examining the individual plots and statistically by computation of relative standard errors (RSE) (standard deviation divided by the mean) within and between individuals, autocorrelations, and correlations across time for the pooled samples.

Visual inspection of the individual plots revealed less dynamism and change over the twelve weeks of CR participation then expected. Although the data displayed a saw-toothed pattern indicating variability, most of the variability in the within-individual scores was small increments and decrements. This may represent the natural variability about the individual's true mean rather than actual dynamic change. There was little evidence of sustained linear change for most women, particularly for physical activity.

Relative standard errors (standard deviation divided by the mean) were computed within and between individuals (Table 5.5). Between-subject RSEs were computed by determining the ratio of the standard deviation and mean of the subject specific mean. Smaller RSEs indicate less variability while larger RSEs indicate greater variability compared to the mean. Comparing within and between individual RSEs there is similar variability within and between individuals over time for the POMS subscale measures of tension/anxiety (SS2) and fatigue (SS5), and for the Goal Setting Scale (GSS). Larger RSEs indicate more variability between individuals than within the individual for the POMS subscale measure of

Table 5.5

Variability Within and Between Individuals

Relative Standard Error (RSE)	POMS	SS1	SS2	SS3	SS4	SS5	SS6	Total	SEW	GSS	BES	STEPS
Within individuals		0.56	0.68	0.57	0.39	0.50	0.74		0.13	0.15	0.18	0.21
Between individuals		0.87	0.65	0.68	0.25	0.52	0.49		0.29	0.21	0.28	0.52

Correlation Coefficients	POMS	SS1	SS2	SS3	SS4	SS5	SS6	Total	SEW	GSS	BES	STEPS
SS2		.391**										
SS3		.661**	.587**									
SS4		.064	-.354**	-.365**								
SS5		.397**	.566**	.598**	-.432**							
SS6		.210	.502**	.290**	-.377**	.392**						
Total		.590**	.753**	.809**	-.687**	.826**	.567					
SEW		.023	-.326**	-.298**	.430**	-.372**	-.233**	-.424**				
GSS		.014	.110	.035	-.068	.07	.291**	.111	.050			
BES		-.165	-.148	-.132	-.287**	.132	.061	0.024	-.425	.127		
STEPS		.169	.048	.001	.361**	-.089	-.150	-.128	.480**	.003	-.291**	

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

anger/hostility (SS1) and depression (SS3), self-efficacy for walking (SEW), and barrier efficacy (BES), and for the level of physical activity (STEPS).

Larger RSEs within the individual indicate slightly greater variability within the person compared to between individuals for vigor (POMS SS4) and confusion (POMS SS6). Within individuals, RSEs were larger for the emotional distress measures of the POMS indicating more variability over time. The within individual RSEs were very small for the behavior change process variables of self-efficacy, goal setting, and barrier efficacy indicating little variability within the person. This pattern of minimal intraindividual variability is also apparent for the measure of the action variable of steps.

The within-person autocorrelations display small maximum values, ranging from 0.25 to 0.5 (Table 5.6). These values indicate, at most, marginally strong autocorrelation for some subjects. However, high negative autocorrelations, ranging from -0.64 to -0.78, indicate that the observations randomly shifted around the subject-specific mean over time for some subjects. These autocorrelations suggest that, in general, there is less consistency, and more variability, from one time point to the next for the individual.

Pearson product moment correlations were computed to examine the relationships of the mood states of vigor and fatigue to efficacy expectations for walking, barrier efficacy, and walking behaviors (Table 5.7). Scores on the vigor subscale of the POMS at baseline and at four weeks were strongly and significantly correlated with self-efficacy expectations for walking at all four time points. However, the correlations diminished substantially and became non-significant at weeks 8 and 12. Vigor, measured at baseline and at 4 weeks, was significantly correlated with barrier efficacy at several time points, but diminished significantly with measurement at weeks 8 and 12. This pattern, of significance with baseline

Table 5.6:

Autocorrelations and Correlations across Time

Measures:	POMS (Total)	SS1	SS2	SS3	SS4	SS5	SS6	SEW	GSS	BES	STEPS
Autocorrelations for Individuals											
Maximum Values	0.29	0.25	0.29	0.25	0.28	0.50	0.26	0.29	0.26	0.31	0.27
Minimum Values	-0.64	-0.77	-0.64	-0.75	-0.67	-0.65	-0.75	-0.64	-0.66	-0.78	-0.77

Correlations across Time

Measure	4 weeks	8 weeks	12 weeks
SS1 (anger/hostility)			
4 weeks	.224	.416	.595**
8 weeks		.549*	.581**
12 weeks			.471*
SS2 (anxiety/ tension)			
4 weeks	.437	.495*	.645**
8 weeks		.704**	.514*
12 weeks			.815**

Table 5.6: *(Continued)* Correlations across Time

Measure	4 weeks	8 weeks	12 weeks
SS3 (depression)			
4 weeks	.638**	.468*	.690**
8 weeks		.617*	.826**
12 weeks			.541**
SS4 (vigor)			
4 weeks	.876**	.504*	.609**
8 weeks		.661**	.754**
12 weeks			.796**
SS5 (fatigue)			
4 weeks	.485*	.404	.622**
8 weeks		.406	.706**
12 weeks			.588**
SS6 (confusion)			
4 weeks	.612**	.549*	.495*
8 weeks		.506*	.469*

Table 5.6: *(Continued)* Correlations across Time

Measure	4 weeks	8 weeks	12 weeks
SS6 (confusion)			
12 weeks			.659**
POMS Total			
4 weeks	.615**	.558*	.764**
8 weeks		.656**	.829**
12 weeks			.831**
Self-efficacy Walking			
4 weeks	.829**	.718**	.812**
8 weeks		.865**	.828**
12 weeks			.779**
Barrier efficacy Scale			
4 weeks	.598**	.579**	.520*
8 weeks		.749**	.768**
12 weeks			.896**

Table 5.6: *(Continued)* Correlations across Time

Measure	4 weeks	8 weeks	12 weeks
Goal Setting Scale			
4 weeks	.377	.324	.502*
8 weeks		.735**	.780**
12 weeks			.772**
Steps			
4 weeks	.870**	.871**	.849**
8 weeks		.886**	.689**
12 weeks			.815**

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 5.7

Correlations of POMS Vigor and Fatigue Subscales with Efficacy and Steps

	Vigor			
	Baseline	4 weeks	8 weeks	12 weeks
SEW1+	.578**	------	--------	---------
SEW2	.589**	.542**	--------	---------
SEW3	.652**	.540**	.299	---------
SEW4	.580**	.476**	.172	.322
	Fatigue			
SEW1	-.219	---------	---------	----------
SEW2	-.460*	-.367	---------	----------
SEW3	-.319	-.217	-.284	----------
SEW4	-.316	-.294	-.049	-.544*
	Vigor			
BES1	.279	---------	---------	----------
BES2	.370	.445*	---------	----------
BES3	.348	.397	-.109	----------
BES4	.517*	.494*	.075	.258
	Fatigue			
BES1	-.159	---------	----------	----------
BES2	-.324	-.215	----------	----------
BES3	-.131	-.232	.129	----------
BES4	-.155	-.517*	.036	-.611**

Table 5.7 *(Continued)*

Correlations of POMS Vigor and Fatigue Subscales with Efficacy and Steps

		Vigor		
STEPS1	.466**	---------	---------	---------
STEPS2	.527**	.451*	---------	---------
STEPS3	.403	.370	.339	---------
STEPS4	.374	.396	.222	.220
		Fatigue		
STEPS1	-.015	---------	---------	---------
STEPS2	-.066	-.135	---------	---------
STEPS3	-.073	-.124	-.014	---------
STEPS4	-.282	-.252	-.161	-.450**

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

+ SEW Self-efficacy for walking

++ BES Barrier efficacy

and 4 week measurement then diminished correlations and no significance at weeks 8 and 12, is repeated with the physical activity measure of steps. Correlations progressively become smaller over the course of CR. Fatigue is negatively, but minimally, correlated with self-efficacy, barrier efficacy, and physical activity except at week 12. Fatigue at week 12 demonstrated a strong, significant inverse correlation with self-efficacy, barrier efficacy, and steps at week 12. This indicates that women with higher levels of fatigue had lower feelings of efficacy for walking and for overcoming barriers to activity, as well as lower levels of activity. These findings suggest that vigor and fatigue measured at baseline and four weeks have little relationship with measures of the behavior change processes at weeks eight and twelve. The strong correlations at baseline and four weeks have little ability to predict efficacy, goal setting, and activity later in the program.

Pearson product moment correlations were calculated to evaluate the relationships of the behavioral change process variables, self-efficacy, barrier efficacy, and goal setting, with the action variable of physical activity, measured by steps (Table 5.8). Self-efficacy expectations for walking were moderately and significantly correlated with steps at all time points, with the exception of week four. Steps at week 12 were significantly and strongly correlated with efficacy expectations for walking at weeks 4, 8, and 12. Goal setting demonstrated minimal correlations at all time points with steps, including several small inverse relationships. Barrier efficacy also demonstrated poor correlations with activity over all time points.

In summary, the measures of contextual factors displayed more variability over the 12 weeks of CR participation than did the behavior change process and activity variables. This suggests there was minimal individual change over the three months of measurement.

Table 5.8:

Correlations of Efficacy and Goal Setting Measures with Steps

	Baseline	4 weeks	8 weeks	12 weeks
		Walking efficacy		
STEPS1	.481*	---------	---------	---------
STEPS2	.326	.357	---------	---------
STEPS3	.460*	.503*	.538*	---------
STEPS4	.503*	.624**	.643**	.677**
		Goal setting		
STEPS1	-.155	---------	---------	---------
STEPS2	.023	.123	---------	---------
STEPS3	-.068	.177	.164	---------
STEPS4	-.135	.067	.117	-.155
		Barrier efficacy		
STEPS1	-.012	---------	---------	---------
STEPS2	-.118	-.004	---------	---------
STEPS3	.010	.068	.016	---------
STEPS4	.055	.201	.207	.259

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Linearity of change. How linear are individual trajectories of change over 12 weeks? Each variable was regressed on time for each individual. The standardized coefficient (*beta*) represents the linear relationship between the independent and dependent variables incorporating the trend slope and the trend correlations and is included whether statistically significant or not. Each woman has 11 *beta* coefficients that represent linear changes over time for the 11 contextual, behavioral change, and action variables. Table 5.9 shows the average *beta* coefficients and ranges for the total and sample and values for three subjects. The *beta* coefficients are all small when compared with the ranges of the variables. The presence of larger standard deviations compared to the *beta* coefficients indicates that the trajectories were relatively flat on average, although the negative signs on the mean slopes indicate that the trends that were present tended to be decreasing over time. Ranges for the *beta* coefficients are wide, reflecting greater diversity across individuals in the linearity of their trajectories.

Although the standardized coefficients are small, data suggest an overall trend of reductions in the POMS subscale measures of anger (SS1), anxiety (SS2), depression (SS3), fatigue (SS5), and the total score for emotional distress. There is a trend towards a slight increase in scores on walking self-efficacy, but decreases in goal setting and the number of steps taken. There is a very small decrease in scores on vigor (POMS SS4) and barrier efficacy over time, and a scant decrease in confusion (SS6).

The *beta* coefficients were compared with the individual plots of the variables over time. When the isolated linear pattern was identified, the regression statistic was concordant. However, when the individual plot revealed high levels of variability or curvilinearity the *beta* coefficient was less informative.

Table 5.9

Patterns of Linear Change over Time

Standardized Beta:	Mean	SD	Range
Total Sample			
POMS –SF (Total)	-0.243	0.578	-0.983 - 0.947
SS1 (anger/hostility)	-0.278	0.463	-0.944 - 0.513
SS2 (tension/anxiety)	-0.367	0.542	-0.944 - 0.775
SS3 (depression)	-0.202	0.504	-0.949 - 0.894
SS4 (vigor/activity)	-0.071	0.657	-0.990 - 0.949
SS5 (fatigue/inertia)	-0.182	0.561	-0.949 - 0.990
SS6 (confusion)	0.014	0.612	-0.923 - 0.923
Jenkins SEE Walking	0.182	0.530	-0.836 - 0.947
Goal Setting Scale	-0.197	0.596	-0.944 - 0.799
Barrier Efficacy Scale	-0.030	0.710	-0.994 - 0.978
Steps	-0.235	0.529	-0.921 - 0.692

Table 5.9 (*Continued)* Patterns of Linear Change Over Time

	Standardized Beta:		
	Subject 201	*Subject 104*	*Subject 110*
	(High Activity)	*(Moderate Activity)*	*(Low Activity)*
POMS –SF (Total)	0.345	-0.983	-0.898
SS1 (anger/hostility)	-0.800	- 0.775	-0.082
SS2 (tension/anxiety)	0.405	0.405	-0.258
SS3 (depression)	-0.775	-0.775	-0.858
SS4 (vigor/activity)	-0.548	-0.800	0.673
SS5 (fatigue/inertia)	-0.933	-0.894	0.990
SS6 (confusion)	0.258	0.759	0.316
Jenkins SEE Walking	0.775	0	-0.347
Goal Setting Scale	0.077	-0.894	0.799
Barrier Efficacy Scale	-0.160	0.968	0.602
Steps	0.800	0.521	-0.376

Group Differences

Levels of activity by grouping on variables. When subjects are grouped by high or low emotional distress, high or low subjective health status, high or low objective health status, high or low self-efficacy, high or low goal setting, and high or low barrier efficacy, which groups adopt higher levels of physical activity? When groups are formed from additional contextual information, which groups adopt higher levels of physical activity? Do groups differ in their patterns of initiating increased physical activity? Groups were formed on the basis of the scores on measures of contextual factors and behavior change processes. Overall means were computed for each group. These groups were then compared for patterns of change in activity using RMANOVA procedures with time as the within subjects factor and groups formed from the scores on the POMS and related subscales, the Jenkins Self-efficacy Expectations for Walking Scale, the Goal Setting Scale, and the Barrier Efficacy Scale (Table 5.10). Additional groupings were formed from the contextual variables of age, subjective and objective health status, level of emotional distress, education, cardiac diagnosis, previous level of activity, number of comorbidities, use of beta-blockers, the use of antidepressant medications, length of time between the cardiac event and the beginning of CR, and number of days in the hospital related to the cardiac event.

Subjects were formed into two equal groups based on age. The younger age group encompassed women ages 43 to 67 and the older age group ranged from 71 to 84 years. RMANOVA revealed that younger women had significantly ($p=.034$) higher levels of physical activity over time when compared with the older group. Visual inspection of the plot of group means revealed widely separated lines with different trajectories. Older women's

Table 5.10

Groupings by Scales with Changes in Activity

	Activity	Activity		
	Start	Baseline – Week 4	Week 4 - Week 8	Week 8 – Week12
POMS Total				
High	low	decrease	decrease	decrease
Low	high	increase	increase	decrease
SS1 (anger)				
High	high	increase	plateau	large decrease
Low	low	slight increase	slight decrease	decrease
SS2 (anxiety)				
High	low	plateau	decrease	decrease
Low	high	increase	increase	decrease
SS3 (depression)				
High	low	increase	decrease	decrease
Low	high	plateau	increase	decrease
SS4 (vigor)				
High	high	slight increase	plateau	decrease
Low	low	plateau	slight increase	decrease
SS5 (fatigue)				
High	low	increase	decrease	decrease
Low	high	plateau	slight increase	decrease

Table 5.10 (*Continued)* Groupings by Scales with Changes in Activity

SS6 (confusion)				
High	low	slight increase	slight increase	decrease
Low	high	decrease	plateau	decrease
Walking efficacy				
High	high	decrease	increase	decrease
Low	low	increase	decrease	decrease
Goal setting				
High	high	increase	increase	large decrease
Low	low	increase	increase	decrease
Barrier efficacy				
High	high	decrease	plateau	decrease
Low	low	increase	slight increase	large decrease

activity was plotted as a gradual, downward linear trend over the 12 weeks. The younger women's activity trajectory revealed a gradual linear increase from baseline to week 8, with a sharp drop at week 12. So, although the two different age groups followed different patterns and trajectories of physical activity, at the end of CR, activity levels for both groups declined.

When the outcome variable of steps was examined over time using the between subjects factor of high or low scores on the total POMS and the six subscales, the results varied, with the exception that by week 12, all groups had decreased levels of physical activity. Even women who scored high on the vigor subscale (SS4) evidenced decreases in their activity levels by the end of CR. A decline in activity levels had begun with many of these grouping categories between weeks 4 and 8 and continued between weeks 8 and 12. As would be expected, women with higher fatigue (SS5) scores had a significantly lower number of steps ($p=0.04$) compared to women in the group with lower fatigue scores.

Scores on the Jenkins Self-efficacy Expectations for Walking Scale (range 0 to 10) were divided into high and low groups with mean scores ranging from 2.78 to 8.15 for the low group and 8.35 to 10 for the high group. Using the level of self-efficacy for walking as the between subjects variable, analysis indicated no significant difference between the groups for activity over time. Visual inspection showed the groups to be widely separated with different patterns. The low efficacy group had an increase in walking between baseline and week 4, then a consistent decline from weeks 4 to 12. The high efficacy group displayed a saw-toothed pattern with a decline from baseline to week 4, an increase from week 4 to 8, and then another drop from week 8 to 12. None of these patterns are consistent with self-efficacy theory since self-efficacy did not increase with continued participation in CR.

The groups formed from scores on the Goal Setting Scale and Barrier Efficacy Scale evidenced no significant differences in activity over time. Although no statistical significance was found, the groups displayed differences in patterns of the means. Low and high goal setting groups displayed linear increases in goal setting from baseline to week 8, although the groups were separated by approximately 1800 steps on average. At week 12, both groups had sharp drops with the high goal setting group reaching a mean with a difference of only 40 steps from the mean of the low goal setting group. High and low barrier efficacy groups had widely separated baseline means, with the high group displaying increased activity at baseline, then falling for the remainder of the study. The low efficacy group began at low activity levels, than increased to the point that the high and low efficacy groups approximated each other's activity at weeks 4 and 6; then both dropped at week 12.

The analyses conducted with the groupings formed from subjective and objective health status, education, cardiac diagnosis, previous level of activity, number of comorbidities, use of beta-blockers, the use of antidepressant medications, length of time between the cardiac event and the beginning of CR, and number of days in the hospital revealed no significant differences between groups. All groupings displayed the trend of decreased activity from weeks 8 to 12.

Levels of variables by grouping on activity. The next phase of the analysis involved forming groups based on the level of physical activity, then looking for differences in the patterns and trajectories of the contextual and behavior change process variables (Table 5.11). Based on the average number of steps over the four data collection points, women were divided into three groups: those with the highest levels of activity (range of steps

Table 5.11

Groupings by Activity Level* with Changes in Scales

	Scales Start	Baseline – Week 4	Week 4 - Week 8	Week 8 – Week12
PA group		POMS Total		
High	medium	decrease	increase	decrease
Low	high	decrease	slight increase	decrease
Med	low	slight increase	slight decrease	decrease
		SS1 (anger)		
High	high	decrease	increase	decrease
Low	high	large decrease	increase	decrease
Med	low	increase	slight decrease	increase
		SS2 (anxiety)		
High	high	large decrease	slight increase	increase
Low	high	plateau	decrease	decrease
Med	low	decrease	decrease	slight increase
		SS3 (depression)		
High	high	large decrease	increase	plateau
Low	high	large decrease	increase	slight decrease
Med	low	plateau	decrease	plateau
		SS4 (vigor)		
High	high	increase	decrease	decrease
Low	low	slight increase	increase	increase
Med	high	plateau	slight decrease	slight increase

Table 5:11 (*Continued)* Groupings by Activity Level* with Changes in Scales

		SS5 (fatigue)		
High	medium	decrease	increase	decrease
Low	high	decrease	increase	decrease
Med	medium	increase	decrease	decrease
		SS6 (confusion)		
High	low	plateau	increase	decrease
Low	high	decrease	decrease	plateau
Med	low	plateau	plateau	decrease
		Walking efficacy		
High	high	slight increase	slight increase	increase
Low	low	slight decrease	slight increase	slight decrease
Med	medium	plateau	increase	plateau
		Goal setting		
High	low	increase	increase	large decrease
Low	low	increase	increase	slight decrease
Med	medium	large decrease	increase	slight decrease
		Barrier efficacy		
High	low	large increase	decrease	plateau
Low	low	increase	increase	large decrease
Med	high	large decrease	slight decrease	decrease

*High activity group range of steps 113,511 – 157,019

Moderate activity group range of steps 49,783 – 79,011

Table 5:11 (*Continued)* Groupings by Activity Level* with Changes in Scales

Low activity group range of steps	20,643 - 46,215

(Average steps over 4 time points)

113,511 – 157,019); those with moderate activity (range of steps 49,783 – 79,011); and those with the lowest activity (range of steps 20,643 – 46,215).

Differences between the physical activity groups were tested by conducting a RMANOVA on the outcome variable of steps with time as the within-subjects factor and level of physical activity as the between- subjects factor. The groups were found to be significantly different from each other.

The analysis began by evaluating the POMS and the POMS subscales by level of physical activity. Analysis revealed a significant ($p=0.025$) linear trend across groups over time for scores on the POMS Subscale 1 (anger/ hostility), with scores decreasing over time. Another significant ($p=0.017$) linear trend across groups over time was found for scores on the POMS Subscale 2 (tension/ anxiety). Scores fell between baseline and 4 weeks and then became stable between weeks 8 and 12. There were no significant statistical differences by level of physical activity for the measures of anger and anxiety. The patterns of group means for the anger subscale were varied and dissimilar with saw-toothed patterns and decreases at week 12. The changes in the anxiety subscale were more gradual and linear, with the exception of the high activity group. Rather than a decrease in anxiety at week 12, as in the other two groups, the high activity group had an increase in anxiety.

The highest and lowest physical activity groups evidenced very similar patterns of change in depression scores (POMS SS3) over time, while the moderate activity group had a flattened pattern indicating a smaller change in scores. The high and low activity groups had similar elevated means at baseline which dropped at week 4, rebounded slightly at week 8, then stabilized at week 12. All three groups had lower depression scores over time. Paired

samples t-tests indicated significant differences between depression measured at baseline and 4 weeks (p=.05) and baseline and 12 weeks (p=.047) for the whole sample.

Changes in vigor scores (POMS SS4) over time differed significantly by group (p=0.022) Post hoc comparisons revealed the low activity group differed significantly from the moderate (p=0.049) and high (p=0.023) activity groups. The low activity group had much lower scores on the vigor subscale, indicating low levels of energy. The low and moderate activity groups had increasing vigor scores over time, while the high activity group had a decrease in vigor from weeks 4 to 12.

High and low activity groups demonstrated very similar patterns of change in measures of fatigue (POMS SS5). The high and low groups evidenced dynamic changes starting high, dropping at 4 weeks, rebounding to the higher measure at 8 weeks, then dropping again at week 12. The moderate activity group again evidenced a very dissimilar pattern, starting at a lower score, increasing by week 4, than dropping Although the low activity group had higher scores at all four time points, the difference was not statistically significant. The moderate activity group had decreasing levels of fatigue but their change was not as erratic, displaying a more flattened trajectory.

The change in measures of confusion (POMS SS6) over time differed significantly (p=0.025) by level of activity. Post hoc comparisons revealed that the difference was between the low and moderate activity groups. The low activity group had higher confusion scores compared with both other groups, but significantly higher than the moderate activity group. Again, the pattern of means displayed by the moderate activity group was less variable and more linear, displaying little change.

There was a significant (p=0.033) linear trend over time for changes in the total POMS scores. All groups had lower total scores by week 12, but the differences in patterns were similar to subscales of the POMS. The high and low activity groups had saw-toothed patterns indicating more change. The moderate activity group had a gradual sloping pattern with little change over time.

Self-efficacy for walking differed significantly over time by level of physical activity (p=0.018). Post hoc comparisons indicated the significant difference to be between the high and low activity groups. The high activity group evidenced greater self-efficacy at all time points compared to both groups, but significantly more than the low activity group. The high activity group also had an increase in self-efficacy at week 12, while self-efficacy scores for walking dropped at week 12 for the low and moderate activity groups.

Differences in goal setting over time were not significant between groups. The high and low activity groups increased linearly from baseline to week 8, then scores decreased by week 12. The moderate activity group began with a high score, dropped at week 4, then rebounded to a slightly higher level by week 12.

Barrier efficacy was the last variable evaluated by level of physical activity. Group differences were not statistically significant, but patterns differed between groups. The moderate activity group began with a high barrier efficacy score at baseline, indicating their confidence in being able to overcome barriers to exercise. However, their scores declined steadily through the remainder of the 12 weeks, ending with a 13 point decline from the baseline score. All activity groups had declining barrier efficacy scores between weeks 8 and 12.

The action variables of steps, BMI, and MET levels were evaluated for change. None of the activity groups evidenced an increase in activity by week 12. The high activity group increased activity levels through week 8 then declined between weeks 8 and 12. The moderate activity group neither increased nor decreased activity levels, remaining essentially static across all four time points. The low activity group evidenced incremental increases and decreases across time points, ending with a small decrease at week 12. Pre and post CR BMI levels were analyzed and found to be significantly correlated ($p=0.020$) but also significantly different ($p=0.042$). Post CR BMI levels were unavailable for those who did not complete CR. Pre and post CR MET levels were analyzed for change among the first CR site participants and those completing CR. Post CR MET levels were unavailable for the second CR site participants and for those not completing CR. No significant differences were found for change in MET levels, although participants' MET levels improved from .70 to 4.90. Differences in level of activity were explored using pre and post CR BMI and MET levels and changes in BMI and MET level. Patterns differed, but no significant differences in activity were found.

In summary, physical activity levels declined for all three physical activity groups by week 12, as well as groups formed from scores on the contextual influences and behavior change process variables. There were clear differences in the patterns of means over time for each of the activity groups. The high activity group evidenced more change and less consistency over time in measures of contextual factors and behavior change processes variables. The moderate activity group had little change in the POMS measures of anxiety, depression, vigor, and confusion, as well as total emotional distress. The low activity group had little

change in the measures of self-efficacy for walking and for anxiety, indicating their confidence in their ability to be active was low while their feelings of anxiety were high. There was a slight increase in self-efficacy for walking at week 12 for the high activity group, although their actual activity level decreased.

Discussion

The women in this study, recovering from a cardiac event and attending a Phase II CR program represent a small and advantaged group. Compared to the average U.S. household the majority of these women lived in households with incomes well above the average. They held professional positions and were highly educated. Many of the contextual factors associated with higher levels of physical activity such as higher education and socioeconomic status (Marcus et al., 2000) do not appear to provide significant advantage in increasing physical activity levels for this sample.

Initial analysis revealed no significant differences in activity by age group, although older women's activity was plotted as a gradual, downward linear trend over the 12 weeks, while younger women's activity increased gradually in a linear fashion from baseline to week 8, followed by a sharp decline at week 12. The influence of a single participant identified as an outlier on the age activity relationship was analyzed. This subject was the fifth oldest woman and was in the high activity group, regularly averaging 10,000 steps per day, or more. Data were analyzed with this case removed and revealed a significant difference ($p=0.003$) by age group for activity. However, because of the small sample size, the exploratory nature of this study, and the focus on physical activity behaviors in older women after a cardiac event, the decision was made to retain this subject in the analysis. Her contributions to the findings

remained substantively informative. Moreover, the goal of this study was not to find statistical significance, but rather to describe process and to identify and evaluate trends.

The age range of this sample indicated a wide dispersion of age. The inclusion of younger women in this sample may represent an earlier recognition and more aggressive treatment of women's cardiac symptoms than in previous years.

The findings related to emotional distress with this sample contradict the relationship between level of emotional distress and level of physical activity described in the literature. High levels of emotional distress are associated with decreased physical activity (Conn, et al., 1991; Riegel & Gocka, 1995). This sample had lower levels of emotional distress when compared to a similar sample. Theoretically, lower levels of emotional distress should promote and facilitate increased physical activity. The lower levels of activity in this sample, and more importantly the declining levels of activity towards the conclusion of CR, would suggest that lower levels of emotional distress were not an advantage that influenced the groups' level of activity.

Although the group means demonstrated decreases in physical activity, description of the individual cases provide a perspective on the personal impact of contextual factors, such as emotional distress, on physical activity, to offset the collective view. Two of the women classified in the high activity group had large decreases in physical activity at week 12. This was associated with increases in anxiety and depression at week 12. In the case of one woman, the higher levels of emotional distress were engendered by returning to a stressful job and not feeling confident about being able to meet all the demands of family, job, and a commitment to a more physically active lifestyle. For the other woman, family problems were creating anxiety and making it difficult to prioritize physical activity. Does the

occurrence of this decrease in activity at week 12 constitute a failure to remain more physically active, or does it represent a barrier to overcome in the daily effort to regulate one's behavior? This question would need to be addressed with further longitudinal exploration designed to follow subjects through the six months of behavior initiation and on to six months of behavior adherence.

Evaluation of the behavior change processes variable of self-efficacy in this sample also contradicted findings from the literature. Social cognitive theory posits that as performance experience increases so does self-efficacy for that specific task (Bandura, 1986). This suggests that self-efficacy for walking should increase after successful walking behavior. The high activity group, which averaged the recommended 10,000 steps per day or more, had a slight increase in self-efficacy for walking at week 12 although their actual activity level decreased. Increases in activity were sporadically related to increases in self-efficacy. Conversely, increased self-efficacy did not precede or occur with increased activity on a regular basis. In the low activity group, there was little change in an already low level of self-efficacy for walking, and their anxiety levels remained elevated. This indicates that in this group of women, confidence in their ability to be active was low, concomitant with feelings of anxiety. The limiting effects of these factors on activity levels support the theoretical propositions in social cognitive theory (Bandura, 1986; Mayou et al. 2000).

Twelve women had disparities between the level of self-efficacy and actual walking behaviors, with self-efficacy exceeding activity levels. This finding concurs with the findings in the study by Carroll (1995) in which her sample of cardiac surgery elders reported levels of self-efficacy for physical activity that surpassed the actual behavior. These findings raise a significant concern about the low levels of self-efficacy in this group. CR is a form of

lifestyle intervention, and as such should be associated with an increase in self-efficacy beliefs and physical activity behaviors. This was not apparent in this sample of women.

How self-efficacy was measured may have influenced the findings of this study regarding the changes in self-efficacy over time. The Jenkins Self-efficacy Expectations for Walking Scale asks the respondent to rate their level of confidence for walking increasing distances from one block to thirty blocks (three miles). Several women indicated they had a difficult time judging the distances they walked while using the treadmill or the Nu-Step during aerobic exercise. This suggests that the self-efficacy for walking scale would benefit from being updated, to include the addition of distances related to the use of specialized gym equipment.

In two reports of a study (Gillis et al., 1993; Gortner & Jenkins, 1990), self-efficacy was measured at baseline in the hospital, then at weeks 1, 4, 8, 12, and 24. The authors found a ceiling effect for self-efficacy between 12 and 24 weeks after cardiac surgery. This study examined the temporal behavior of self-efficacy during the 12 week period surrounding participation in CR, which occurred at varying times in the course of women's recovery. The aforementioned studies assessed the resumption of activity after a cardiac event. Many other studies examining self-efficacy longitudinally measured the time immediately following a cardiac event (Allen, 1996; Carroll, 1995; Jenkins & Gortner, 1998) Other studies measured self-efficacy at a single time point (Conn et al., 2003; Resnick et al., 2000; .This study measured self-efficacy during a period of change that occurred 2 to 21 weeks after the cardiac event. These variations in the time parameters surrounding the cardiac event and the recovery process make comparisons between studies difficult.

Measurement of the motivation appraisal variables of goal setting and barrier efficacy indicated little correlation with physical activity. Women reported few goal-setting activities throughout participation in CR. Mean scores on the Goal Setting Scale across the four time points ranged between 3.29 and 3.51 indicating that women were close to the "neutral" response represented by 3. The question associated with determining the importance of goal setting was consistently scored the highest of the six questions with the means indicating respondents "agreed" with the statement. The remaining five questions asked about specific goal related behaviors such as setting goals, writing down goals, developing plans for evaluating goal achievement, talking with others about goals, and rewarding for goal achievement. Mean scores on these questions remained very close to neutral across time points suggesting that setting goals was not a particularly important strategy. When group differences across time were examined with RMANOVA there were no significant differences in goal setting by age group or by level of physical activity. Although there are differences in the patterns of how the means changed, mean scores remained below the level of "agreement" for statements in the Goal Setting Scale.

The lack of statistical correlation or significance could indicate this was not an adequate measure for this population or this study, or perhaps goal setting is not as relevant for women middle-aged and older. The Goal Setting Scale measures the level of agreement with statements reflecting goal oriented behaviors. Women may agree with the statements, but that does not mean they are enacting the behaviors necessary to effectively set and achieve goals. A more appropriate means to measure goal setting would be to evaluate self-reports of actual goal setting behaviors in a dichotomized "yes/ no" format, and then to test it as a between subjects factor.

The other issue with assessing goal setting involves its relevance to an older population and may be best summed up by the response of one of the older participants when she was being administered the Goal Setting Scale in the interview format. When asked the question about her level of agreement with the importance of goal setting activities, she responded that she agreed that goal setting was important, but only in relation to short term goals. She stated that she no longer made long term goals because she was too old. Although this insight was not reiterated by other participants, nor was it solicited, this perspective on goal setting by older adults could provide an area for future exploration. The findings indicate there is a need to better understand goal setting in this population. Do older adults set long term goals? What are the parameters for goal setting by older adults? What are the processes involved in goal achievement for older adults?

Theoretically, goal identification leads to an enhanced sense of readiness for initiating and sustaining health behavior changes (Gollwitzer, 1999). Goal identification provides motivation which in turn promotes the development of goal achievement strategies (Fleury et al., 2001). The neutral positions on goal setting by this group of women suggest that these crucial steps in the change process may not be occurring. The absence of an enhanced sense of readiness to enact behavior change may have influenced the level of activity these women engaged in. Moreover, the readiness to initiate change requires a plan of action and specific strategies for goal achievement (Fleury, 1991). Thus, the responses on the Goal Setting Scale and the decreased activity levels displayed by these women as they approached the conclusion of the 12 week CR program suggest there may have been a lack of readiness to sustain the health behavior change after program completion by many of the participants. These findings support those of Conn, Tripp-Reimer and colleagues (2003) in which the major predictor of

older women's sedentary behavior was a lack of commitment. The lack of commitment implied a lack of motivation, goal setting, and readiness as with this sample.

Confidence in one's ability to effectively plan and strategize ways to facilitate physical activity behaviors is necessary to overcome barriers to physical activity. Women in this study reported a considerable loss of confidence in their abilities to overcome barriers to physical activity over time as they neared the completion of CR. It is not known if this represents a shift from a more optimistic perspective to a more realistic perspective on overcoming barriers when physical activity is no longer medically prescribed and covered by insurance.

Women with high efficacy to overcome barriers to physical activity had increased baseline levels of activity, which then declined throughout the remainder of the 12 weeks. Women low in efficacy began with low levels of activity, realized an increase between weeks four and eight, then a sharp decrease in activity at week twelve. Barrier efficacy in the groups formed by level of activity decreased across the three groups by week twelve. These findings suggest that efforts are needed to enhance women's confidence in their ability to continue to be physically active in the face of obstacles. Education and assistance with goal setting and planning, and discussions of realistic ways to deal with barriers should begin during early CR and continue regularly until CR completion. Rehabilitation staff should consult with women regularly to determine their needs for education and assistance with this important aspect of planning for a more physically active lifestyle. Participants in this study noted that the opinions, input, and encouragement of CR staff were essential to their efforts at improving their health and working towards the secondary prevention of heart disease, indicating that CR nurses and staff are in a unique position to influence and assist women working towards lifestyle change.

The distinct patterns of change described for the activity variable of steps were not specific to any of the groups formed based on the mean number of steps. Women from all the groups created by activity level were found in these variable patterns. The four women who exhibited an increase in activity at week 12 included one woman from the high activity group, one from the low activity group, and two from the moderate activity group.

This brings to question what actually constitutes initiation behaviors. Is initiation defined by a number goal, such as 10,000 steps per day, or by a pattern of activity? Three of the women in the group that evidenced a pattern of increased walking from weeks 8 to 12 had step counts below the 10,000 steps per day mean, but their increased activity pattern could suggest that these women were in the process of increasing their activity levels more slowly than the high activity group. The woman from the low activity group reported a history of occasional exercise behaviors, had functional limitations, several comorbidities, and a complicated recovery from the cardiac event and subsequent interventions. Yet, in spite of her limitations, she was engaging in increased physical activity behaviors, when compared to her past and to other older women in this study. This indeed represents a change in behavior. Perhaps judging the initiation behaviors of older women on the basis of a set of normative behaviors from younger people is unrealistic and guarantees their failure. Are physical activity recommendations for older women realistically achievable? Do they need to be modified to provide a more individualized plan for achieving and evaluating what constitutes successfully increasing the level of physical activity? Initiation and adherence behaviors for older women may need to be redefined and incorporate a combination of indicators, including the regularity of physical activity behaviors, the trend in physical activity behaviors, and the short and long term effects of the increased physical activity behaviors.

The analysis of the level of physical activity by the day being monitored indicated that women were not as active when planned, structured activities were not incorporated into the day. Women's activity levels were highest on the CR day, low on the non-rehabilitation day and lowest on Sunday. Saturday was not significantly different than the CR day and this suggests that Saturday is a day of planned personal and family activities. Thus, planned excursions and tasks on a Saturday provide a higher level of physical activity than week day activities, while Sunday remains a day of rest. Some women noted that they often felt fatigued after participating in CR and restricted their activities the day following CR in compensation. However, this observation held only for the weekday following CR, since Saturday followed a CR day on Friday. This suggests that the input, encouragement, and demands of family members influenced the level of these women's activity.

Although easy to use and wear, the pedometer, as a measure of physical activity, may have accounted for the limited evidence of physical activity behaviors in this group of women. The pedometers may not have captured adequately the variety of physical activities women were involved in. Within the context of the exercise environment, some of the activities involved working with weights or riding an exercise cycle. After completing the CR program, four women began participating in water aerobics because of back and knee problems. One of the women that dropped out of CR swam regularly during the summer.

Thirteen women experienced changes in their DASI scores that ranged from 3.18 to 34.58 Changes are considered clinically meaningful when scores increase by two or more units (Hlatky, et al., 2002). One woman had an increase of 1.94, but six women scored decreases in their DASI totals in spite of 12 weeks of CR participation. This suggests that although the DASI can be converted into a quantifiable MET level, it is very much subject to the woman's

perspective on her ability to engage in certain activities. Many of the same women that scored lower MET levels as measured by the DASI had increased MET levels as measured by the Graded Exercise Test. Do these perceived decreases in activity tolerance influence women's physical activity behaviors? Table 5.4 describes the differences between women's stated risk factors and those documented in the medical record. There were many discrepancies in these risk factors with stress often being cited by women as the cause of the cardiac event, although stress was never documented in the medical record. The lower levels of physical activity in this sample of older women and their perceptions of personal cardiovascular risk and physical capabilities support the findings in previous studies in which women who viewed themselves as healthy reported increased activity levels compared to women who rated their health as poor (Eylar et al., 2003).

Three women reported current smoking behavior, even during recovery from the cardiac event. Two of the women who smoked, dropped out of CR. Although they cited the reasons for dropping out as no time to participate because of work and family obligations, does the continuation of smoking create feelings of dissonance in the CR environment and make continued participation uncomfortable?

Strengths and Limitations

There are strengths and limitations to this study. The study and its subsequent findings are limited by the small sample size. Even after setting the alpha level for the statistical tests at 0.05, although Verbrugge and colleagues (1998) suggested 0.10, there is limited confidence in significant findings because of the small size and special characteristics of the sample.

Since the purpose of this study was exploratory in nature, these findings can be used to identify future directions of interest for research and exploration, and should not be construed as suggesting the findings are significant or generalizable to other populations.

That being said, the strengths of this study are the symmetry and completeness of the data collected with the twenty women over the four time points. Moreover, because of the close and ongoing contact with these women during recruitment and data collection at both sites, women provided much anecdotal information to better contextualize the processes of health behavior change. If the change processes experienced by these women were presented only from the data gathered through the questionnaires it would result in a one-dimensional view of change, rather than the more contextualized view offered by the addition of the explanations offered by these women to better understand the day to day realities of their lives.

In order to better understand women's initiation behaviors, initiation behaviors should be studied in relation to adherence behaviors. This would require following a sample of women through participation in CR and for six months following completion of CR, allowing conclusions to be made about the relationship between initiation behaviors and adherence behaviors.

Women completing CR could be interviewed about their future plans for incorporating physical activity into their daily lives, and their confidence in their ability to continue being physically active after completing CR. Women could be asked to describe the progress they made from CR entry to graduation to develop a better understanding of their perspectives about increasing physical activity. Do they feel successful in their efforts? What could have enhanced their experience with CR?

An additional direction for future research might include following this cohort of women for a year to tie initiation to adherence behaviors. Women who have successfully maintained physical activity behaviors could be interviewed about the barriers and facilitators to their activity behaviors, and how they dealt with each challenge.

Research has identified barriers to physical activity (Fleury, Lee, Matteson, & Belyea,, 2004), but little is known about the facilitators of physical activity in older women. Women identified as successfully increasing the level of physical activity in their lives could provide important information on how they incorporate daily physical activity and keep it prioritized.

Typical gym-based aerobics may not meet women's needs for an enjoyable, attainable form of physical activity. There is a need to better understand women's preferences for physical activity formats. What types of activities might be more conducive to women's participation in increased physical activity behaviors? Women could be surveyed to better understand their needs and preferences.

Men are noted to be more successful in increasing physical activity behaviors after CR participation. How do men differ in their patterns of increasing levels of physical activity after a cardiac event? What makes them more successful in the initial phases of becoming more physically active?

Clinical Implications

Evidence from this small convenience sample of women indicates that, in spite of participating in a health behavior change intervention in the CR program, there was little change in the factors that influence physical activity behaviors. Measures of self-efficacy for walking and barrier efficacy decreased between weeks 8 and 12, even though women were still participating in CR. This suggests that additional efforts need to be made to assist

women with setting goals for overcoming barriers and continuing a program of physical activity when they are no longer participating in CR. Nurses working with women post cardiac event and CR staff are in a position to assist women with making health behavior change permanent. By assisting women with identifying those things that are barriers to and facilitators of continuing physical activity behaviors, perhaps women could maintain the enthusiasm with which they started CR.

Research Implications

The results of this study suggest there are issues with the temporal behaviors and variations in self-efficacy expectations over time. This may be related to the age of this sample of women, or to the measure of self-efficacy employed in the study. The questionnaire and measurement of goal setting could be better specified to capture the self-report of actual behaviors rather than the level of agreement with statements about goal setting. The concept of goal setting with an older population requires further exploration. Do older adults set long term goals? Older women may engage in a wider variety of physical activity behaviors than those captured with a pedometer. Efforts are needed to identify more objective measures of physical activity behaviors. Finally, are traditional programs of CR adequate for facilitating women's increased physical activity behaviors? Are there other exercise formats that would better serve women's physical needs and preferences and be more enjoyable?

In conclusion, this study makes a modest contribution to furthering the understanding of older women's efforts at health behavior change. The results of this descriptive exploratory study raise questions and avenues for further research. In the relatively new area of study,

exploring gender-based medicine and care, much more remains to be known about older women and their physical activity behaviors after a cardiac event.

CHAPTER 6

WOMEN'S USE OF SOCIAL COMPARISONS TO GAUGE PROGRESS WHILE PARTICIPATING IN PHASE II CARDIAC REHABILITATION

Coronary heart disease is the leading cause of death and the biggest threat to independence and quality of life in women over age 50 (Speroff, 1993). Cardiac events like myocardial infarction, angioplasty or stent insertion represent major illness and may act as a trigger event, or turning point, initiating the process of redefining the self within the context of the illness or its sequelae (Charmaz, 1991). The turning point represents an emergent reality that "supersedes past meanings and foretells future selves" (Charmaz, p. 210). Gibbons (1999) refers to this change as a response shift. The precursors of a response shift, significant life events, also effect a change in the amount and type of social comparisons in which the individual engages. A health related response shift usually results in increased interest in and use of downward comparisons. Research suggests that during periods of stress, uncertainty, or change people often engage in more social comparison activities (Taylor, Buunk, & Aspinwall, 1990).

Social comparison is defined as any process in which the individual relates their own personal characteristics to the characteristics of others (Buunk, Gibbons, & Visser, 2002). Individuals engage in social comparisons to obtain information, make self-evaluations, engage in self-enhancement (Taylor et al., 1990), and make self-improvements (Helgeson & Taylor, 1993; Wood & Taylor, 1991).Social comparisons may influence the individual's adaptation to illness and enactment of health behavior changes. Making downward

comparisons, by situating the self in relation to others doing less well, improves one's self-evaluation and allows for self-enhancement. By engaging in downward social comparisons, emotional distress, especially feelings of anxiety or depression, is reduced by allowing an individual to place the self in relation to others who may not be doing as well. Persons engaging in downward comparisons experience improved self- evaluation through the mechanism of self-enhancement. Engaging in upward comparisons, looking at those doing better and comparing one's own progress, theoretically acts as a source of hope, motivation, and inspiration, and may help meet emotional needs (Taylor et al., 1990).

A synthesis of findings from qualitative research with women recovering from illness and trauma suggested that women use downward comparison, or minimization, to measure the impact of their losses (Kearney, 1999). Comparing one's self to others provides a mechanism for placing personal losses in context along a continuum of personal tragedy and facilitates reaffirmation of what one has left. Women may experience emotional distress when they see only the losses, not what is left. Validation from experienced others facilitates women's efforts at reconciling losses, while peer support allows women to see how others have managed changes. Social comparison activities may have relevance for women's coping (Wood et al., 1995), although research concerning women and social comparisons yields conflicting results. A number of studies included only a small percentage of women and did not analyze those data differentially (Helgeson &Taylor, 1993; King, Clark, & Friedman, 1999). However, in a large cohort of older women, social comparisons were very salient in the process of psychosocial adjustment (Heidrich & Ryff, 1993). Both upward and downward comparisons were positively related to psychological well-being in older women, although

the sample of older women study faced no immediate health threat other than threats associated with aging.

A main motive for social comparison is the creation of a common bond with another person (Helgeson & Mickelson, 1992). Contacts with similar others may provide social comparison functions that help to satisfy social support needs, and social support has been shown to contribute to enhanced recovery from health threats (Kulik, Mahler, & Moore, 1996; King, Reis, Porter, & Norsen, 1993). Thus, the supportive aspect of social comparison may enhance emotional well-being and promote health (Helgeson & Taylor, 1993).

Little is known about the link between social support in all its guises and women's engagement in healthy lifestyle practices (Toobert et al., 1998). Findings from qualitative and quantitative studies offer some intriguing evidence. Women recovering from a cardiac event voiced the need to share and compare experiences as part of the process of adjusting to the disease process and the required lifestyle changes (Fleury, 1991; Fleury et al., 2001), a process theoretically congruent with social comparison activities. Women expressed that sharing experiences with friends, especially those who had heart disease, was very important in supporting their efforts at making lifestyle changes and psychosocial adjustments (LaCharity, 1997). Women attending CR and participating in a support group experienced enhanced thinking about the lifestyle changes through observing others who had initiated behaviors toward recovery and lifestyle change (Fleury et al., 2001). The women also had the opportunities to make emotional comparisons with others concurrently sharing the same health threat. Women participants in the qualitative research were frequently enrolled in CR programs (Fleury et al.; Johnson & Morse, Helpard & Meagher-Stewart, LaCharity), which provided them with access to role models and to other women who had experienced cardiac

event. Through sharing experiences with other women experiencing similar life events, women experienced normalizing and healing and were able to seek reassurance through validation with others (Benson, Arthur, & Rideout, 1997; Fleury, Kimbrell, & Kruszeweski, 1995; Johnson & Morse, 1990; LaCharity, 1997). Moreover, in this researcher's qualitative pilot work, the two women participants often discussed the influence of having others, who also had experienced a diagnosis of CHD, to compare themselves with (Lunsford, 2000). These opportunities to make social comparisons occurred within the context of a formal CR program for one woman, and in regular Alcoholics Anonymous meetings for the second woman.

The ability to place one's self in a context with others in similar situations may be particularly salient for someone facing a health threat, since ill people often relate difficulties in obtaining information about the course of the illness and expectations and experiences of treatments. The inability to obtain necessary information increases the person's difficulties in making objective self-evaluations and increases subsequent emotional distress, which may not be alleviated by direct action (Tennen, McKee, & Affleck, 2000).Moreover, social comparisons may be particularly relevant for women who are considered to be embedded in relationships and see the self in the context of these relationships (Kemmelmeier & Oyeserman, 2001). Perhaps the health promotion benefit of making social comparisons may lie with the ability to see another person enacting health behavior changes. Seeing someone similar may serve as inspiration and confirmation of one's personal ability to achieve a similar goal. A sense of companionship with another person striving towards the same goal may foster the desire to continue the behavior change. In making social comparisons the individual has an opportunity to obtain information and to identify potential candidates on

whom they can model behavior changes. Consequently, social comparison may play a pivotal role in the individual's adaptation to illness and the need to enact health behavior changes.

Cardiac rehabilitation (CR) programs are designed to help individuals attain an optimal level of physiologic and psychosocial functioning, while attenuating the progression of underlying disease. Viewed from the patient's perspective, the most significant effects of CR are within the psychological domain (Ades, 2001). Moreover, CR programs provide a supportive environment, which offers participants a forum for receiving relevant feedback and a venue for role modeling and social support

Helgeson and Taylor (1993), in a cross-sectional study, examined social comparison activities in 60 patients enrolled in CR for less than 18 months. They measured social comparison frequency, perception of personal resources and resources of others, preference for affiliation, feelings about dealing with other CHD patients and when interacting with others who are better or worse off, self-esteem, psychological distress, and physical health. Surprisingly, 40% of the participants reported not making social comparisons. This may have been the result of the retrospective, cross-sectional design, but may have also reflected the participants' reluctance to admit to making comparisons. Findings indicated that participants actually made downward comparisons in all dimensions, evaluating themselves as better off compared to others, and by making these comparisons the participants felt lucky.

Results of a study with a cohort of women within five years of treatment for breast cancer revealed similar findings (Stanton, Danoff-Burg, Snider, Cameron, & Kirk, 1999). Before participating in an experimental intervention, women were asked to rate themselves on prognosis and adjustment compared to non-specified, similar others. The women considered themselves to be better off and reported feeling lucky compared to someone not doing as

well. Conversely, they felt inspired by someone doing better. After watching tapes with comparison targets of women with breast cancer, other findings suggested that even when compared to a high functioning target women managed to construe a positive self-assessment.

King and colleagues (1999) assessed the social comparison processes of individuals undergoing CABG. The data provided an opportunity for a secondary analysis. The original study was a prospective longitudinal study of social support and cardiac surgery. Data had been collected before undergoing a CABG, then one month and one year later. Social comparison statements were extracted from recorded semi-structured interviews about social support. Results included finding no difference in social comparison activities related to mood, and finding that social comparisons were made before and one month after surgery, but were not prevalent at one year. At one year women reported extensive use of temporal comparisons in which they compared their present health status and progress to the time and events surrounding being newly diagnosed with CHD.

Limitations of the body of research on social comparisons under health threats include design and sampling issues. Studies are limited by the use of cross-sectional study designs to measure a process (Heidrich & Ryff, 1993a; Helgeson & Taylor; Stanton et al., 1999). Moreover, the data collection points in the secondary analysis of CABG patients were widely spaced, missing much of the process involved in making social and temporal comparisons (King et al., 1999), although it was a repeated measures design. This body of knowledge includes studies of health threats from experimentally manipulated scenarios enacted with undergraduate psychology students for class credits (Giordano, Wood, & Michela, 2000; Sun & Croyle, 1995; Wilson, Chaplain, & Thorn, 1995). Although theoretically intriguing, these

studies are not included in this review and critique because of their very limited applicability to the study reported here.

Single instrument and single occasion measurement characterize these published studies. Numerous instruments were developed for each specific study and lacked the psychometric data to assess instrument validity and reliability. In the study with older women, Heidrich and Ryff (1993b) provided full details for their social comparison instrument development. Wood (1996) suggests the inconsistent findings of research on social comparisons are the result of the practice of using one method to measure social comparison, particularly when done retrospectively. These limitations of research into social comparisons suggest the need for longitudinal assessment and a mixed methods approach. A mixed methods approach is concerned with the methods used in the study (Sandelowki, 2000). For this study, mixed methods included data collection and data analysis techniques. Two methods, a questionnaire and open-ended interviews, of data collection and analysis facilitated the purpose of this study, to describe and explore the social comparison processes women engaged in while participating in a program of CR. The following questions guided the analysis and presentation of the data.

For women who have experienced a cardiac event and are participating in a Phase II program of CR:

1. What is the frequency with which they engage in upward comparisons and downward comparisons?
2. What are the relationships between social comparisons and outcomes of making comparisons in a longitudinal assessment?
3. How do social comparisons change over time?

4. What are the emotional outcomes of making upward comparisons and downward comparisons?
5. What are the social comparison processes they engage in to judge their progress in recovering from a cardiac event and in becoming more physically active?
6. What are other ways they judge their progress in recovering from a cardiac event and in becoming more physically active?
7. What do they do when feeling discouraged about their progress?
8. Where do they look for inspiration?

Methods

Sample Selection

Women were recruited from two CR facilities in central North Carolina. Potential subjects were identified by attending the weekly staff meetings at both sites in which incoming C R participants were presented. Women were eligible who were participating in a Phase II CR program after experiencing a cardiac event defined as an MI, CABG, or PTCA, or receiving a diagnosis of stable angina. Additional criteria included being newly enrolled in the CR program, able to speak and read English, able to hear and respond to questions, able to give informed consent, and able to follow instructions over the four data collection points. Newly enrolled means the woman had participated in fewer than five exercise sessions within the first two weeks of enrolling, and had never been enrolled previously in a program of CR. Once potential participants were identified, a flier describing the study was placed in the packet received by new CR participants. Actual contact with potential participants for the purposes of recruiting was delayed until the third or fourth exercise session per the request of both program directors.

Data Collection

After providing informed consent, participants completed a demographic assessment and a package of questionnaires that included the Social Comparisons Scale (Heidrich & Ryff, 1993b). All participants completed a self-report measure of social comparison orientation at baseline and twelve weeks. However, this method provides limited understanding of the thoughts and processes involved in making social comparisons. Therefore, a sub-sample of six women was asked to participate in brief interviews during week 4. The interviews were comprised of six open-ended questions about social comparisons. The sub-sample of women was obtained through purposeful sampling based on age, previous history of exercise, type of cardiac event, and work status, which continued until theoretical saturation had occurred.

The interviews were conducted in privacy in designated and reserved spaces at both CR facilities, and were recorded and subsequently transcribed by the principal investigator for analysis. All participant information was entered into the database using number identifiers rather than names to maintain confidentiality.

Assessment of Social Comparisons

Questionnaire. The Social Comparisons Scale (Heidrich & Ryff, 1993b) was used to measure social comparisons, the cognitive process of comparing the self to others. Heidrich and Ryff (1993b) developed and tested an instrument for measuring the frequency of engaging in social comparisons and the subjective outcomes of making the comparisons across various life domains. Forty-two older, community dwelling women completed a packet of questionnaires that contained measures of health, well-being, and social comparisons. Women reported engaging in social comparisons some of the time, and felt they were somewhat better off than others. They reported making more frequent comparisons

in the domains of health, physical appearance, coping with aging, and activity level. Women reporting higher levels of emotional disturbance also reported making more frequent social comparisons and faring less well in the comparisons. The internal consistency alpha coefficients for the frequency and outcome scales were 0.87 and 0.95 respectively.

In a second study Heidrich and Ryff (1993b) revised the original social comparisons scale and specified three scales to assess the frequency of upward and of downward comparisons, rather than a global frequency of comparisons. The third scale assessed the consequences of making comparisons. Two hundred forty-three older, community dwelling women completed measures of physical health and psychological well-being along with the social comparison measure. The internal consistency coefficients were 0.91 for the upward frequency scale, 0.92 for the downward comparison scale, and 0.94 for the consequences scale. Data from this study were used to test three hypotheses regarding the relationships among physical health, social comparisons, and psychological well-being. Findings suggested that the effects of physical health on psychological well-being were mediated by the frequency and the consequences of engaging in social comparisons.

After assessing the data generated by the social comparisons measure, the authors decided the scale that assessed the consequences of making social comparisons demonstrated a more significant effect on well-being than the frequency of making comparisons (Heidrich & Ryff, 1993b). Findings from this analysis demonstrated that social comparisons mediated the relationships between physical health and the three mental health outcomes, measured as psychological distress (depression and anxiety), as traditional subjective well-being measures (life satisfaction and affect balance), and as developmentally derived measures of well-being (autonomy, positive relationships, and personal growth).

The current form of the instrument consists of 12 questions about circumstances in which social comparisons might be salient. Each question consists of 4 parts, asking the respondent to rate the frequency and the consequences of making upward comparisons and downward comparisons. The 12 questions inquire about social comparisons in the dimensions of aging, physical health, problem solving, dealing with life changes, managing health issues, life satisfaction, learning new things, physical appearance, feelings and emotions, being active, and the quality of relationships with family and friends. Development of the instrument took place with older, community dwelling women who had health issues, but were not coping with an immediate health threat and the need to change lifestyle behaviors. Consequently, some of the questions on the social comparisons scale lacked relevance for the purposes of this study. Therefore, the number of questions was reduced to six questions that address the domains of physical health, problem solving, dealing with life changes, managing health issues, feelings and emotions, and being active.

Interviews. Qualitative data collection techniques were employed to generate a richer description of the processes of social comparison and the respondents' subsequent thoughts and feelings about the process. Some evidence suggests that when asked to respond in a yes or no format to questions about engaging in social comparisons, respondents often indicated they did not engage in social comparisons (Helgeson & Taylor, 1993). Thus, the addition of open-ended questions promotes dialogue and allows probes for further explication. This provided another dimension of understanding of circumstances, processes, and outcomes of social comparisons. Open-ended questions about social comparison activities and other mechanisms for gauging progress provided prompts but allowed the informant to contextualize and elaborate on the themes.

Patton (1990) states that the aim of qualitative interviewing is to minimize the imposition of predetermined responses when asking questions. Thus, the use of open-ended questions permitted respondents to reply in their own terms. An interview guide was used to ensure that the same information was obtained from all respondents by covering the same material. Vague answers to questions were probed to further elicit clarification. Words of thanks, support, and encouragement were offered to the participant throughout the interview process to convey respect, appreciation, and to promote additional verbalization (Patton, 1990).

Data Analysis

Quantitative Analysis

Data from the Social Comparisons Scale were described using measures of central tendency, the mean, standard deviation, and range. Frequency distributions and univariate descriptive statistics are provided (Table 6.1). Correlations among the Social Comparisons subscales over time are presented (Table 6.2). Single sample t-tests with an alpha level of $p \leq 0.05$ were conducted to compare this sample to the sample of community dwelling older women described in the study by Heidrich & Ryff (1993b). Paired sample t-tests compared the differences in measures of social comparisons at baseline and twelve weeks. Internal consistency was estimated with Cronbach's alpha reliability coefficient, and for this study it was .94 at baseline and .96 at 12 weeks. Quantitative data analysis will address questions one through four.

Qualitative Analysis

Digitally recorded interviews were transcribed after listening to the recordings multiple times. Interviews were read repeatedly to develop an overall impression of the content. To ensure consistency, the content from each interview that answered specific questions about

Table 6.1

Means and Standard Deviations for Social Comparisons Scale

	Mean (*SD*)		
	Baseline	Week 12	Range
Frequency upward comparisons	2.18 (.87)	2.33 (.91)	4 to 30
Feelings from upward comparisons	2.55 (.97)	3.11 (.96)	4 to 30
Frequency downward comparisons	2.43 (.77)	2.46 (.77)	4 to 30
Feelings from downward comparisons	3.34 (1.06)	3.44 (1.11)	4 to 30

Table 6.2

Correlations of Social Comparisons Subscales over Time

	Baseline			Week 12			
	Up	Feel	Down	Feel	Up	Feel	Down	Feel
Frequency upward Baseline		.586**	.669**	.332	.765**	.043	.503*	.073
Feelings upward Baseline	.		.556*	.589**	.313	.412	.274	.219
Frequency downward Baseline	.			.659**	.446*	.174	.384	.153
Feelings downward Baseline	.				.165	.260	.017	.105
Frequency upward 12 weeks						.069	.733**	.158
Feelings upward 12 weeks	.						.525*	.904**
Frequency downward12 Weeks								.621**

social comparisons was highlighted. Additionally, content that was requested as follow up to direct questions about social comparisons was highlighted. Content coded as social comparisons included looking at other people, talking with other people, or thinking about other people involved in physical activity or who had experience with CHD. Data related to social comparisons were organized into files by informant. Answers from different informants were grouped, allowing for cross-interview analysis for each question in the interview guide.

Content analysis began with reading the interviews and making comments and notations as reading progressed. Several readings of the data were undertaken to adequately assess placement within the organization scheme. The process of labeling and classifying data was followed by a search for patterns and themes across cases. This process was repeated until further analysis revealed no new classifications and all themes had been tested in all six interviews.

Trustworthiness of the data analysis techniques was promoted in several ways. Interviews were digitally recorded, transcribed verbatim, and then the transcripts were checked for accuracy. Coding of data was verified by an experienced qualitative researcher. Additionally, an audit trail was maintained of decisions about coding, definitions, and categorizations of data.

Combined Data Analysis

Each of the data sets, quantitative and qualitative, was analyzed with their respective techniques. Results of the individual analyses were combined at the interpretive level (Sandelowski, 2000), linking the quantitative and qualitative explanations.

Results

Characteristics of the Sample

Twenty women were recruited for the larger study with a sub-sample of six women selected to participate in interviews. The six women were selected for differences in age, cardiac diagnosis, and previous experiences with physical activity behaviors to provide greater breadth of perspectives. Their ages ranged from 48 to 78 years with a mean age of 67.3 years. Cardiac diagnoses included an MI without intervention, MI with angioplasty and stent insertion, and cardiac symptoms with angioplasty and stent insertion. Half of the women classified themselves as regular exercisers prior to the cardiac event, while half were non-exercisers. Four women were married and two divorced. The women's levels of education included high school education (3), college (2), and graduate school (1).

Findings with Social Comparisons Scale

The means, standard deviations, and ranges are provided for the subscales of the Social Comparisons Scale in Table 6.1. Single sample t-tests were performed to compare this sample to a sample of community dwelling older women (Heidrich & Ryff, 1993b). Women in this sample reported making fewer upward and downward comparisons, but there were no significant differences between them and the community dwelling older women. However, this sample of women reported significantly lower levels of positive feelings associated with making upward comparisons at baseline and 12 weeks ($p<.0001$). The women also reported significantly lower levels of positive feelings associated with making downward comparisons at baseline ($p=.002$) and week 12 ($p=.010$).

To address the question, what are the relationships between social comparisons and outcomes of making comparisons in a longitudinal assessment, correlations of the subscales

over time were conducted and are presented in Table 6.2. A strong correlation (.904) is noted between feelings associated with upward comparisons and feelings associated with downward comparisons at week 12. There is a moderately strong correlation (.765) between the frequency of making upward comparisons at baseline with the frequency of making upward comparisons at 12 weeks. Moderately strong correlations were also seen for the frequency of making upward comparisons with the frequency of making downward comparisons at baseline (.669) and at week 12 (.503). Feelings associated with making upward or downward comparisons at baseline were weakly correlated with the frequency of comparisons or feelings associated with making comparisons at week 12 (.412 and .219 respectively). Correlations of the frequencies and emotional outcomes of making upward and downward comparisons with other study measures, emotional distress, self-efficacy for walking, goal setting, barrier efficacy, and activity, at baseline and 12 weeks were very small, ranging from .007 to .243. Results from the measurement of social comparisons suggests that making social comparisons had little to do with physical activity behaviors or the factors theorized to influence these behaviors.

Paired samples t-tests were conducted to assess for differences in measurements taken at baseline and 12 weeks. There were no significant differences in the frequency of upward or downward comparisons over time. There were no differences in the feelings engendered by engaging in downward comparisons over time. However, women felt significantly better ($p= 0.028$) at week 12 after engaging in upward comparisons, compared to how they felt about making upward comparisons at baseline. The means associated with the frequency of making social comparisons in the domain of physical activity were slightly, but not significantly, higher at week 12 compared to baseline. There were no differences in the

frequencies of engaging in upward comparisons compared to engaging in downward comparison behaviors. There were no differences over time in the frequencies of making upward and downward comparisons for the areas of physical health, dealing with problems of daily living, dealing with change, managing healthcare, and dealing with feelings and emotions.

Collectively these results suggest little change occurred in the frequency of making social comparisons and little change in the emotional outcomes associated with making downward comparisons over time. Therefore, even when given the opportunity for engaging in social comparisons in the CR environment, women did not report engaging in increased social comparison behaviors. This may be due to a number of factors. Women may have been reluctant to admit to making social comparisons. Moreover, the ages of the women or the absence of comparison targets in the CR environment, given the very small number of women in both programs, may have limited the opportunity to identify comparison targets.

Qualitative Findings

Data were first categorized according to social comparisons theory resulting in two categories, upward comparisons and downward comparisons. Data not placed in those two categories were grouped according to other mechanisms participants used for judging progress and other sources of inspiration and motivation. This assisted in answering the questions about what social comparison processes and other mechanisms women engage in to judge their progress in recovering from a cardiac event and in becoming more physically active

Two of the six women denied engaging in social comparisons for the purpose of evaluating their progress in recovering from a cardiac event or for evaluating their progress

in becoming more physical activity. They shared a perspective that they did not consider themselves to be recovering from a cardiac event. This was in spite of their diagnoses and the fact they had both undergone angioplasty with stent insertion for blocked coronary arteries and were attending programs of cardiac rehabilitation.

One woman noted, “I don’t look at myself as having had any event. I just had blocked arteries. I didn’t have a heart attack or anything. I just had surgery, an endarterectomy, and a stent in my coronary artery. But I don’t feel any different or like I’m recuperating”. This perspective was echoed by the other participant, “I feel like I never had a heart attack. You know, I mean, they tell me I did, but I find it hard to believe”. Moreover, both women described their health as good and believed they could accomplish strenuous physical activities without difficulty or restrictions. Stated beliefs of personal capabilities included “I’m not cardiac restricted. I could walk to Chapel Hill from here if I wanted to. . .” and “I am physically fit. I could do, I think, anything that I wanted to”.

Both of these women stated they did not look to others for support or motivation, instead declaring that “I am my own support”. A 66 year old woman with a prior history of exercise behavior stated “I’m pretty hard on myself. I just know that I have to do it, so I do it. I look inside I guess. I feel pretty confident in my ability to keep myself motivated”. Although these women denied engaging in social comparisons, they each later described making a social comparison, respectively illustrating cases of upward and downward comparisons.

In another instance, one of the women who claimed “I do not look at other people” demonstrated competitive behavior with another woman as they were completing CR. The program obtained a Graded Exercise Test at program entry and exit to evaluate improvements in aerobic capacity. The women graduates were quite competitive with one

another to see who performed the best on the test and who had realized the biggest improvement in aerobic capacity.

Upward Comparisons

Four of the six women provided descriptions of upward comparisons. Upward comparisons were identified when the women portrayed someone engaging in higher levels of physical activity. One woman described seeing ". . . other people who are jumping around like crazy and I think, Whew, I wish I could do that". This same informant noted that "I watch the aerobic people and I think, boy, I wish I could do that, but I just don't think I could keep up with all those complicated steps they're doing and everything else".

Other women acknowledged recognition of more active others, but uniformly they expressed that they were satisfied with their own progress and not threatened by the disparities with the comparison targets. A woman provided a vivid description of the high level of physical activity demonstrated by one of the male CR participants, but placed it in perspective, "But I don't let that bother me. Well, I thought he was doing fine, but it didn't bother me that I wasn't doing it. I know my limitations". Another woman acknowledged her limitations compared to ". . . some people here that really work out hard. And I mean, you know, I don't think I'm quite giving it that, but kind of giving it the best that I can do".

Social comparison theory posits that engaging in upward comparisons should result in an opportunity for obtaining information and identifying potential candidates that model behavior change. Early research suggested that a risk of engaging in upward comparisons was finding one's self lacking, resulting in emotional distress. However, contemporary research has proposed a more positive effect of upward comparisons, the opportunity to identify role models and sources of inspiration and motivation for change (Collins, 1996).

The women in this study acknowledged high performing comparison targets, but recognized and accepted their own limitations. This suggests that in older women adjusting to CHD, upward comparisons may have a different outcome.

Downward Comparisons

All but one woman described engaging in downward comparisons. However, there was quite a bit of variation in the frequency and detail of making downward comparisons. Downward comparisons were identified when individuals described another person who was not fairing as well physically or was having difficulty engaging in physical activity behaviors. Only one of the two women that denied engaging in social comparisons described an actual instance of making a downward comparison. She noted that "I feel thankful because you see a lot of people that have to use a walker". The second woman made an observation "I do see if somebody's wobbling or something" but did not relate this observation to herself in any way.

Women making downward comparisons in this group reported feeling grateful and thankful, ". . . and I see some people as they're walk, struggling through things and I think, wow, that's got to be rough. And I feel lucky that I'm just sitting there able to row and to do the things I can do". Another woman simply stated that "There but for the grace of God go I". They were able to recognize and appreciate their own progress and abilities when witnessing the efforts of other less fortunate individuals. One woman stated that seeing less fortunate others helped her by ". . . trying to see the positive".

For the women in this study, witnessing the efforts of individuals functioning at lower levels in the CR facilities resulted in feelings of inspiration. One informant offered multiple instances of observing less fortunate others, providing an exemplar description of the

observations and associated emotional outcomes. "…And some of them are walking around with walkers and they're looking like they're just not going to make it all the way around the track. And you think, by God if that woman can come out here and do that . . . There's a woman who comes here, I think she's older than I am, she looks quite elderly. She's overweight and she has to wear a huge brace of some kind and I've watched her, she's out there making her way, albeit slowly, around the track. I admire that. That's inspirational." Inspiration came, not only from observing less fortunate others with physical limitations, but also from observing an individual with a history of multiple heart attacks who was seen as successful in his efforts, ". . . he's had several heart attacks and, and . . . he just loves this place and you watch him and he's just having a ball out there. . . he looks so healthy, so you think, if somebody like that can do that, then I can certainly do anything I'm supposed to do and be happy with it".

Participants in a program of CR reported engaging in more downward social comparisons, which made them feel better about themselves and their situation, as well as feeling grateful when comparing themselves to those not doing as well. Engaging in downward comparisons offered the women sources of inspiration, but also resulted in the opportunity to place their capabilities and limitations in perspective. "When you're here you're conscious of other people, and you've gotten to learn a little bit about some of their histories. I would have to say that some of the histories I have heard here are so severe and frightening that, you know, I mean that mine was not in that category . . . I think they've done remarkable." The accomplishments of those with more severe problems inspired and contextualized the women's own experiences with CHD and with health behavior change. One woman described comparison targets that were dealing with a variety of life-altering chronic illnesses

to include CHD, diabetes, and stroke, noting that ". . . one person has all of those and more, and they still . . . have a positive outlook and they still feel like they are making progress, and life goes on. So, I'm just not going to worry about it all. I'm going to try and do the things I have to do".

Several women reported downward comparison targets that were outside of the CR environment, including family and friends. These comparisons offered an opportunity for the women to more realistically assess their own progress since the individuals they were comparing to were more like themselves. "I've got two brothers who have both had major interventions . . . they did do rehab, but they're not keeping it up, and I don't want to be there. You know what I mean? And I wish that they would . . . put more of that in their lives than they're doing. So that's how I view them. I feel a little bit superior but I know it's easy to fall off the wagon". Recognition of the limited efforts at health behavior change by her brothers gave this woman the opportunity to feel good about her own efforts, while providing her with a clearer picture of potential barriers and pitfalls. The potential for losing focus in enacting health behavior changes was recognized by another woman in describing the lifestyle change efforts made by a friend who had experienced a heart attack. "And I know that right after she had her heart attack she was really scared and he was too. So I think they really focused on all of this (health behavior change) for a while, but then, you know, they kind of slacked off. And she said, you know, if you're not careful, you will too. Which I think is true". These comparisons allowed the women to visualize possible future selves to be avoided.

What are the emotional outcomes of making upward comparisons and downward comparisons? Engaging in downward comparisons resulted in a variety of outcomes. Women

experienced gratitude for their recovery and progress and inspiration at witnessing the will and efforts of less fortunate others. Women were able to gain perspective on their own capabilities and progress, and could recognize desired and feared possible future selves.

Much of the research on social comparisons suggests that the individual engages in downward comparisons for the purpose of self-enhancement, or feeling better about the self. These women experienced feeling better, but not at the expense of the comparison target. They seemed to describe feeling better about their progress in more of a relational sense in which the comparison target's efforts and circumstances were considered in their assessment and interpretation of the comparison. One woman offered her perspective "Just meeting these people and coming to care about their issues, I think that's been helpful, I think it's been a very healthy thing. See you're not going to get that walking the dog in the neighborhood. I mean, I have a great bond with the dog, but I'm not going to have that kind of interaction as with other people".

Research about the gender effects of engaging in social comparisons may offer some insight into women's uses of and responses to social comparison information. Men view themselves as independent, focusing on uniqueness, self-determination, and personal abilities. Men are more likely to interpret downward comparisons as self-enhancing without regard for the circumstances of the comparison target (Kemmelmeier & Oyserman, 2001). Women are more likely to see themselves as interdependent, resulting in a self that is contextualized and embedded in relationships, and more likely to be empathetic and sensitive to the plight of others (Kemmelmeier & Oyserman).

One woman offered comments and insights about making downward comparisons that have been minimally explored and represented in the literature. She expressed that being

aware of others doing less well made her aware that it could happen to her. “There have been some people that get into that program and end up having big issues. (Some people have problems when they move from CR to exercise program). The other thing here that can be the downside of all this is being exposed to people and sort of wondering, well, is that the next phase. (You mean is this going to happen to me?) Yes, exactly. You do worry about it, you worry about it”. Wood and colleagues (1985), in discussing the results of their study of social comparison activities in women with breast cancer, offered the possibility that making downward comparisons could result in identification with the downward comparison target and an awareness of the possibility for one’s own decline in health and abilities. However, empirical evidence of this response to engaging in downward comparisons has been lacking with the exception of the work done by Kemmelmeier and Oyserman (2001) who have explored women’s use of social comparisons in the academic and business environment. They note that downward comparisons made by women do not always result in self-enhancement. Rather the information about someone doing less well may trigger a more realistic self-assessment that results in a downward adjustment of their own chances of success or failure.

Women were asked by what other means they judged their progress in recovering from CHD and in enacting a more physically active lifestyle. They offered examples of temporal comparisons, or comparing themselves to how they were in the past and how they wanted to be in the future. There were more past temporal comparisons than future comparisons. Their future temporal comparisons involved “Envision(ing) how I want be”. Another woman offered that she was just becoming aware of what these changes meant for her future, “I mean like this morning I thought, this morning was probably the first day I really thought,

this is the kind of schedule and changes I will have to keep for the rest of my life. Well, like it's a little overwhelming when you think about it in the long term".

Making temporal comparisons to the past most often involved "Going back to doing what I normally did prior to the heart attack". Another woman offered a comparison standard from her past noting that she was "Seeing my stomach get flatter than it was before". Two women discussed past comparisons but took their past behaviors as a cautionary example for the future "Knowing now that if I don't continue doing things I'm doing, I could be right back where I was". Another woman described that her goal was not to look at her watch one day and decide she had no time for exercise, acknowledging that "I don't want to get into that because I know I can fall into that easily. I know that it's hard to maintain things. That's kind of worrisome. How you come from the past".

Several women compared their current recovery from CHD to past experiences with other health care issues. "I've had other tough things in my life, health issues . . . they were more interventionist things you go in and fix it. This is the thing that's so off-putting about all this, it isn't like, and that's the part where you can get depressed by it, or kind of get in that more fatigued state, because it's not like a broken arm. They ain't gonna set it and you ain't gonna walk out". This theme, of being responsible for "fixing" themselves after being diagnosed with CHD was verbalized by several women. "Well this one's up to me. I have to take care of it now. With the other ones (surgery), I didn't have to do anything afterwards. They cut me open, took it all out, cleaned it out, sewed me up, and said you're fine. I just put it aside because I don't have to do anything about it". Making comparisons to past experiences with health issues may have helped the women place having CHD in perspective, highlighting their personal responsibility and involvement with the recovery process. Having survived and

overcome past health events provided information about personal abilities, but does not seem to have affected their need for making social comparisons as these two women offered multiple examples of engaging in comparisons.

Although caution is required in drawing definitive conclusions from this small, convenience sample, the results raise interesting questions that remain to be answered. It is unclear, for instance, whether having an alternative perspective from which to view health problems makes a difference in the frequency and direction of women's use of social and temporal comparisons.

The comments by the women in this study indicated that their experiences with CHD were very different from their experiences with other health issues. They emphasized their personal responsibility in this recovery process. One woman acutely felt her personal responsibility noting that she would have to manage the prescribed lifestyle changes because "They didn't do any surgery, they didn't put a stent in. I have to do it because it is my treatment. . . . someone said, well your treatment is the medicine and the lifestyle changes". Taken together, these statements reflect the personal nature of working towards adjustment to living with a chronic illness and adjusting to lifestyle changes associated with CHD. Even with the medical "fix" of stent insertion, the women realized that the lifestyle changes necessary for recovery and secondary prevention were their responsibilities. Moreover, they used their self-knowledge of past behaviors to maintain their focus on establishing new behaviors.

In addressing the question about other sources of inspiration and motivation for recovery and for initiating a more physically active lifestyle, the women included their physicians, the exercise coaches and staff, "Coaches, having that attention and that connectedness when you

come in to do your workout, absolutely helps you keep focused and gives you the energy to keep going. It (coaches) makes it all fit together in a really nicely designed program". One woman described the impact of the total experience, sharing that other sources of support and inspiration lacked validity, "(It) can't be anybody outside of this realm. You know because your friends are always saying crap, oh you look great or oh, you're doing well. That doesn't carry the same weight."

Discussion

The women in this study described making a few upward comparisons, many downward comparisons, and a limited number of temporal comparisons. However, it should be noted that the women providing these perspectives on social and temporal comparisons came from very different CR programs. The women that provided the least amount of social comparisons description probably did not have as much opportunity for making comparisons because their program was conducted in a dedicated set of rooms occupied only by the CR class and staff. Women providing the richest descriptions and examples of making social comparisons attended CR in a program where everyone exercised together. Exercisers included healthy members of the wellness center, seniors in a senior activity program, CR participants, and pulmonary rehabilitation participants. Of particular note, participants in the pulmonary rehabilitation program included individuals awaiting and recovering from lung transplantation. These individuals were comparison targets functioning at significantly lower levels of activity than other attendees. Perhaps the reason the women did not engage in self-enhancement while making these downward comparisons was because the comparison targets were very ill and very different. The limited number of women participating in both CR programs may also have been a limiting factor in having comparison targets.

Results of the psychometric assessments of women's social comparison activities with the Social Comparisons Scale (Heidrich & Ryff, 1993) revealed that making social comparisons was not a primary activity for these women. They reported engaging in fewer upward and downward comparisons when compared to a sample of older, healthy community dwelling women. Theoretically, upward comparisons should result in feelings of inspiration, while downward comparisons should result in self-enhancement. Both have been associated with improved mood. However, these women did not evidence improved emotional outcomes. Instead, when compared to other women, they had lower levels of positive feelings associated with making upward comparisons and with making downward comparisons. This finding persisted from baseline to measurement at 12 weeks.

When the relationships between making comparisons and the feelings associated with making comparisons were evaluated, findings indicated that the frequencies of making upward and downward comparisons were correlated. However, there was little relationship between the frequencies of making comparisons and the associated emotional outcomes. Therefore, engaging in more frequent comparisons did not necessarily improve how women felt about their physical health, dealing with problems of daily living, dealing with change, managing healthcare, and dealing with feelings and emotions.

Analysis of the questionnaire data revealed no significant differences in the frequencies of making upward or downward comparisons between baseline and 12 weeks, indicating that women did not increase their use of social comparisons over time. Neither did the women experience better emotional outcomes from making downward comparisons. However, they did feel better after making upward comparisons at week 12. The improvement in women's feelings after making upward comparisons does suggest a change over time. In the

interviews, the women offered limited descriptions of making upward comparisons and in those descriptions indicated that they were content with their capabilities compared to higher functioning others. Perhaps having such a realistic perspective on their own capabilities allowed the women to feel better about themselves even when comparing to those functioning at a higher level. Women may have been feeling better about their own improvements in activity tolerance and behaviors between the baseline measure and week 12. Feeling better about personal capabilities may have made comparisons with higher functioning others less threatening and more inspirational. In fact, recognition that they were approaching the activity behaviors of the higher performing comparison target may have resulted in feeling even better.

Previous studies of social comparison behaviors have been in the dimension of emotional and psychological adjustment during periods of high uncertainty. Participants included women with breast cancer (Wood et al., 1985), CR participants (Helgeson & Taylor, 1993), and CABG patients (King et al., 1999). The use of open-ended interview questions in this study provided the informants with two dimensions for making comparisons, those of physical activity behaviors and recovery from a cardiac event.

Information provided about engaging in social comparisons was often contradictory. When questioned directly about making social comparisons, several of the women denied engaging in social comparisons. However, when asked about sources of inspiration and motivation or what their thoughts were when exercising with others, the women responded with comments indicative of making social comparisons, usually downward comparisons. Other samples have demonstrated reluctance to make direct comparisons, but evidence of social comparisons is found in their narratives. Women with breast cancer demonstrated similar

behaviors. They denied making direct comparisons when questioned, but compared themselves with others doing less well (downward comparisons) when asked to assess their own progress (Wood et al, 1985). Helgeson and Taylor's (1993) sample of CR participants evidenced the same reluctance to report making social comparisons.

This sample of women provided some evidence of engaging in temporal comparisons. Women offered few examples of making future-oriented temporal comparisons. The limited temporal comparisons that were made focused more on learning from the past so as not to make the same mistakes in the future. Research indicates that temporal comparisons are particularly salient for older adults over age 65. Older adults engage in more temporal comparisons than social comparisons because of age-related physical declines and a diminishing social environment (Brown & Middendorf, 1996). The lack of similar or realistic comparison targets for older persons provides another reason for engaging in temporal comparisons (Wilson & Ross, 2000). Although the mean age of this small sample of women was over 65, they did not evidence age-related decrements in physical capabilities, nor did they describe restricted social environments. For these reasons, temporal comparisons may not have been a relevant strategy for judging progress for this group of women.

Several women described a different type of temporal comparison activity in which they compared their progress and recovery from a cardiac event to previous experiences with recovering from surgery. In each instance, previous surgeries were viewed as having been "fixed", while recovery from a cardiac event was seen as a personal responsibility that was not amenable to being fixed. Informants shared that it was their responsibility to work toward recovery from CHD. This was particularly apparent in the account of the woman who had no surgical or radiological intervention after a heart attack. She voiced the realization that

lifestyle changes were her treatment and her responsibility. In other words, no one was going to fix them and make them better.

Engaging in activities to promote lifestyle change after a cardiac event would seem to be a time of uncertainty, specifically uncertainty about one's capabilities and tolerance for participating in increased physical activity behaviors. Gibbons (1999) posits that the usual response shift to a threatening event, and the accompanying uncertainty, involves focusing one's self-assessment away from the dimension that is under threat. For example, if a person has experienced a serious health threat, such as a cardiac event, they will move the focus of their self-appraisal away from activity and health related dimensions, and may instead focus on psychological adjustment or their social support structure. This may have particular relevance for women's initiation of a more physically active lifestyle. They are being instructed to engage in behaviors in a dimension that is under threat, their physical status and activities. However, failure to engage in increased physical activity behaviors would go against the medical prescription and the intention of secondary prevention. Therefore, even though they may be experiencing the desire to avoid the dimension of physical activity with its physical demands, women must make this dimension a primary focus in the recovery process. Thus, for many women, incorporating and increasing physical activity behaviors may be not only unfamiliar, but threatening and disconcerting. Several women spoke of their concerns related to physical activity, but only those unfamiliar with physical activity in their past found the new activities disconcerting. Another woman who characterized herself as a lifelong exercise expressed concern about having chest discomfort when exercising.

One type of response shift brought on by a health threat involves the person changing their internal standards of measurement, or in effect recalibrating their comparison scale. Gibbons

(1999) notes that this type of response shift is most often associated with downward comparison activities. However, the women's reports of making upward comparisons described a change of perspective in making upward comparisons. Four women described making upward comparisons. In each instance of making upward comparisons, the women recognized and acknowledged those functioning at a higher level. However, none of the women indicated that the upward comparison targets were a source of inspiration or motivation. Instead, the women recognized the other person's abilities, but then noted that it was acceptable that their own progress was not at that level. This suggests that comparisons with the high performers provided a mechanism by which the women situated their own abilities, rather than judging themselves and finding themselves lacking. Moreover, the women realistically interpreted their own capacities without interpreting the performance of others as a threat.

Women in this study engaged in more downward comparisons than in upward or temporal comparisons. This may be the result of having more comparison targets in the CR environments that were functioning at lower levels. As noted above, one CR program had more downward comparison targets compared to the other program. The women experienced feelings of gratitude and thankfulness when comparing themselves to those functioning less well, rather than describing these comparisons as self-enhancing, or making them feel better about their own progress. Research suggests that women are very sensitive to those around them (Kemmelmeier & Oyserman, 2001). While participating in programs of CR, women may see others struggling to recover and to change unhealthy behaviors. Could this process of identifying with a less fortunate other be one of the reasons for women's poor participation in CR programs? Do women avoid situations in which they are confronted with

other people who may not be doing well? Does a downward adjustment in women's perspectives on personal recovery influence their participation in health behavior change activities?

These findings indicate that the CR environment provided opportunities for making upward and downward comparisons. In addition to seeing peers involved in physical activity behaviors, the coaches provided encouragement, focus, and continuity. The entire experience of CR participation provided a focused, consensual environment in which everyone was there for the same purpose. However, even when given the opportunity for engaging in social comparisons in the CR environment, women did not report engaging in increased social comparisons, either as measured with the Social Comparisons Scale or in describing making social comparisons.

Women's limited use of social or temporal comparisons to assess their progress may be due to a number of factors. Women may have been reluctant to admit to making social comparisons. Moreover, the absence of comparison targets in the CR environment, given the very small number of women in both programs, may have limited the opportunity to identify comparison targets. Another possible factor in their limited use of social and temporal comparisons may have been their reliance on exercise staff for feedback and judgments of their progress. Exercise staff were consistently available to CR participants, monitoring their progress and offering suggestions, feedback, and encouragement. The involvement of the exercise staff may have made comparisons with other participants less salient and less informative.

In summary, women did not demonstrate an increased frequency of engaging in social comparisons over time as measured with the Social Comparisons Scale. Neither did the

women evidence increases in positive affect from making downward comparisons, although there were improvements in affect associated with making upward comparisons. Even though the women were recovering from a cardiac event and were initiating health behavior changes, the threat associated with the cardiac event may no longer have been immediate enough to elicit a response shift with the accompanying increase in downward comparisons (Gibbons, 1997). The women described making downward comparisons in the interviews, but they did not indicate that it was a frequent activity on the Social Comparisons Scale.

Research suggests that when social comparisons are not a primary mechanism for judging progress and status, temporal comparisons become more prominent, particularly for older persons. However, the women in this sub-sample provided few indications of making temporal comparisons, with the notable exception of comparing the cardiac event to previous experiences with surgery. In interpreting the data from the Social Comparisons Scale and the open-ended interviews, there is no compelling evidence that this sample of women relied on social or temporal comparisons as a frequent mechanism for assessing their status and their progress in recovering from a cardiac event or in initiating a more physically active lifestyle. Rather, it appears that the women relied on feedback and input from their physicians to assess the progress in recovering from a cardiac event, and from the exercise staff for gauging their progress in becoming more physically active.

A strength of this study is the use of open-ended interviews to explore women's social comparisons during cardiac rehabilitation. The interviews allowed the respondents to describe social comparison processes, and add to what is known about women's engagement in social comparisons in this particular context. The findings generated from the interviews with this small sample of women in CR raise several questions for further study. Is the use of

social comparisons to judge personal progress related to the meaning of the cardiac event and the level of threat experienced? Are there differences in how women experience and interpret upward comparisons? Are these factors related to the comparison target or to a change in how the women viewed themselves? Had these women realistically assessed their current capabilities and revised their self-schemas to include not being limited by, but living with, heart disease? Does the limited use of upward comparisons by this sample of older women indicate a need for making relevant age-related functional comparisons? Were the comparison targets that were viewed as doing better too different in age, not dealing with similar recovery issues, or different in other important ways? Women may have lacked realistic candidates for making upward comparisons.

Previous explorations of women's use of and responses to social comparison activities have been very limited. Much extant research on social comparisons has been conducted with men or with undergraduate students, limiting generalizability to women, especially older women, since there is evidence that gender and age differences exist. This small exploratory study highlights the necessity for more work in this area to better understand the mechanisms that women use in recovering from CHD and becoming more physically active.

APPENDIX

Study Instruments

Appendix I

ID #_____
Date:_____
Facility:_____

Demographic Data

DOB_____

Ethnicity/ Race
____ Caucasian
____ African American
____ American Indian
____ Latino
____ Asian
____ Other

Partnered Status
____ Single (never married)
____ Married
____ Divorced
____ Separated
____ Widowed
____ Partnered

Highest level of education completed
____ Grade level
____ High school
____ Trade school
____ College
____ Graduate school

Work Status
_____ Employed
_____ Full time ____ Part time
_____ Retired
_____ Occupation

____ Number of adults living in your home
____ Number of children < 18 living in your home
____ Number of children > 18 living in your home

Annual household income
____ <20,000
____ 20,001 – 40,000
____ 40,001 – 60,000
____ 60,001 – 80,000
____ 80,001 – 100,000
____> 100,000

Additional illnesses
_____
_____
_____

Cardiac risk factors
Stated_____
Chart _____

Cardiac diagnosis information
Date of diagnosis _____
Type of CHD diagnosis _____
Surgery _____ Intervention _____
Hospitalized _____ Yes _____ No _____ Dates
Current medications: _____
_____

Prior level of physical activity. I exercised: _____ 3 times/ week or more (regularly)
_____ less than 3 times/week (intermittently) _____ Occasionally _____ Never

Appendix II

ID# _____Date:_____ T1 T2 T3 T4

DUKE ACTIVITY STATUS INDEX (DASI)

Can You_____?	Yes, with no difficulty 1	Yes, with some difficulty 2	No, I can't do this 3	Don't do this for other reasons 4
1. Take care of yourself? (eating, dressing, bathing, using the toilet)				
2. Walk indoors, such as around your house?				
3. Walk 1 or 2 blocks on level ground?				
4. Climb a flight of stairs or walk up a hill?				
5. Run a short distance?				
6. Do light housework? (dusting, dishwashing)				
7. Do moderate housework? (vacuuming, sweeping, carrying groceries)				
8. Do heavy housework? (scrubbing floors, lifting or moving heavy furniture)				
9. Do yard work? (raking leaves, weeding, pushing power mower)				

Can You_____?	Yes, with no difficulty 1	Yes, with some difficulty 2	No, I can't do this 3	Don't do this for other reasons 4
10. Have sexual relations?				
11. Participate in moderate physical activity? (golf, bowling, dancing, doubles tennis, throwing a baseball or a football)				
12. Participate in strenuous sports? (Swimming, singles tennis, football, skiing, basketball)				

Appendix III

ID #_____ Date:_____ T1 T2 T3 T4

PROFILE OF MOOD STATES – SHORT FORM (POMS-SF)

Below is a list of words that describe feelings people have. Please read each one carefully. Then, circle the number to the right which best describes how you have been feeling during the past week including today.
The numbers refer to these phrases (descriptions).

0 = Not at all
1 = A little
2 = Moderately
3 = Quite a bit
4 = Extremely

	NOT AT ALL	**A LITTLE**	**MODERATELY**	**QUITE A BIT**	**EXTREMELY**
1. Tense	0	1	2	3	4
2. Angry	0	1	2	3	4
3. Worn out	0	1	2	3	4
4. Lively	0	1	2	3	4
5. Confused	0	1	2	3	4
6. Shaky	0	1	2	3	4
7. Sad	0	1	2	3	4
8. Active	0	1	2	3	4
9. Grouchy	0	1	2	3	4
10. Energetic	0	1	2	3	4
11. Unworthy	0	1	2	3	4
12. Uneasy	0	1	2	3	4
13. Fatigued	0	1	2	3	4

ID #_____ Date:_____ T1 T2 T3 T4

14. Annoyed.	0	1	2	3	4
15. Discouraged	0	1	2	3	4
Nervous.	0	1	2	3	4
17. Lonely	0	1	2	3	4
Muddled.	0	1	2	3	4
19. Exhausted	0	1	2	3	4
Anxious	0	1	2	3	4
21. Gloomy	0	1	2	3	4
22. Sluggish.	0	1	2	3	4
23. Weary	0	1	2	3	4
24. Bewildered.	0	1	2	3	4
25. Furious.	0	1	2	3	4
26. Efficient	0	1	2	3	4
27. Full of pep.	0	1	2	3	4
28. Bad-tempered	0	1	2	3	4
29. Forgetful.	0	1	2	3	4
30. Vigorous	0	1	2	3	4

Appendix IV

ID_____T1 T4

SOCIAL COMPARISONS SCALES

People sometimes compare themselves with other to get a sense of how they are doing in life. I am going to describe a few areas in which people may compare themselves with others and ask you some questions about these comparisons.

Please read each example, and then answer the questions by circling the number that best reflects what you do. Please circle only *one* number for each question.

1. When it comes to your physical health:

Do you compare yourself to someone better off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself				Good about Myself
1	**2**	**3**	**4**	**5**

Do you compare yourself to someone worse off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself				Good about Myself
1	**2**	**3**	**4**	**5**

ID_____T1 T4

2. When it comes to your ability to solve problems of daily living:

Do you compare yourself to someone better off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself **Good about Myself**

1	2	3	4	5

Do you compare yourself to someone worse off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself **Good about Myself**

1	2	3	4	5

3. When it comes to your ability to deal with change in your life:

Do you compare yourself to someone better off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself **Good about Myself**

1	2	3	4	5

Do you compare yourself to someone worse off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself **Good about Myself**

1	2	3	4	5

ID_____T1 T4

4. When it comes to your ability to manage your health care:

Do you compare yourself to someone better off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself **Good about Myself**

1	**2**	**3**	**4**	**5**

Do you compare yourself to someone worse off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself **Good about Myself**

1	**2**	**3**	**4**	**5**

5. When it comes to how you deal with feelings and emotions:

Do you compare yourself to someone better off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself **Good about Myself**

1	**2**	**3**	**4**	**5**

Do you compare yourself to someone worse off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself **Good about Myself**

1	**2**	**3**	**4**	**5**

ID_____T1 T4

6. When it comes to being able to be as active as you want:

Do you compare yourself to someone better off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself				Good about Myself
1	**2**	**3**	**4**	**5**

Do you compare yourself to someone worse off than you?

Never	Rarely	Occasionally	Often	Always
1	2	3	4	5

How do these comparisons make you feel?

Bad about Myself				Good about Myself
1	**2**	**3**	**4**	**5**

Appendix V

Interview Guides

Social Comparisons The interview guide to describe social comparison processes follows.

I would like to ask you some questions about how you think, feel, and deal with issues related to lifestyle changes and heart disease.

1) How do you compare your progress in recovering from your cardiac event (specify)? In relation to someone you knew that had something similar? To people with the same problems? To how you were at another time in your life? To how you want to be?

2) How do you compare your progress in becoming more physically active? As above

3) What do you do when you are feeling discouraged about your progress after having a cardiac event (specify)? How do you behave? How do you deal with the emotions? What do you do to encourage yourself?

4) When you are exercising with the other people participating in CR with you, what do you think about when you are exercising with them? Do you compare your progress to theirs? How does that make you feel about yourself?

5) Where do you look for inspiration?

6) Who do you receive the most support from for making lifestyle changes? Spouse, family, friends, others with CHD?

Outcome Expectancies: The interview guide to describe outcome expectancies and their value follows.

1) What do you expect to accomplish or achieve from participating in this CR program? Physically? Mentally? Emotionally? Health? Confidence?

2) What is the value of these outcomes for you?

Appendix VI

ID #_____ Date:_____ T1 T2 T3 T4

Jenkins' Self-Efficacy Expectations for Walking Scale

WALKING – How confident are you right now of your ability to walk:

Mark your answers from:
0 = not at all confident to 10 = totally confident

from your bed to the bathroom?	0	1	2	3	4	5	6	7	8	9	10
around inside your home?	0	1	2	3	4	5	6	7	8	9	10
½ block?	0	1	2	3	4	5	6	7	8	9	10
1 block?	0	1	2	3	4	5	6	7	8	9	10
2 blocks?	0	1	2	3	4	5	6	7	8	9	10
3 blocks?	0	1	2	3	4	5	6	7	8	9	10
4 blocks?	0	1	2	3	4	5	6	7	8	9	10
5 blocks?	0	1	2	3	4	5	6	7	8	9	10
6 blocks?	0	1	2	3	4	5	6	7	8	9	10
7 blocks?	0	1	2	3	4	5	6	7	8	9	10

ID #_____ Date:_____ T1 T2 T3 T4

8 blocks?	0	1	2	3	4	5	6	7	8	9	10
10 blocks? (1mile)?	0	1	2	3	4	5	6	7	8	9	10
15 blocks? (1.5 miles)?	0	1	2	3	4	5	6	7	8	9	10
20 blocks (2 miles)	0	1	2	3	4	5	6	7	8	9	10
30 blocks (3 miles)	0	1	2	3	4	5	6	7	8	9	10

Appendix VII

ID #_____ Date:_____ T1 T2 T3 T4

Jenkins' Activity Checklist for Walking

A. Instructions: In the course of each day you carry out many activities. Please think about each of the following activities. Use a check mark to indicate whether or not you performed each one in the past 24 hours, or if the activity was not applicable to your situation.

WALKING

	Yes	No	Not Applicable
from your bed to the bathroom?			
around inside your home?			
½ block?			
1 block?			
2 blocks?			
3 blocks?			
4 blocks?			
5 blocks?			
6 blocks?			
7 blocks			

8 blocks			
10 blocks (1 mile)?			
15 blocks (1.5 miles)?			
20 blocks (2 miles)			
30 blocks (3 miles)			

Appendix VIII

ID #_____ Date:_____ T1 T2 T3 T4

Jenkins' Self-Efficacy Expectations for General Activities Scale

GENERAL ACTIVITIES – How confident are you right now of your ability to perform the following activities:

Mark your answers from:

0 = not at all confident to 10 = totally confident

brush teeth?	0	1	2	3	4	5	6	7	8	9	10
take a shower?	0	1	2	3	4	5	6	7	8	9	10
shampoo hair?	0	1	2	3	4	5	6	7	8	9	10
get dressed (regular clothing)?	0	1	2	3	4	5	6	7	8	9	10
write a letter/bill?	0	1	2	3	4	5	6	7	8	9	10
empty a small wastebasket?	0	1	2	3	4	5	6	7	8	9	10
make a sandwich?	0	1	2	3	4	5	6	7	8	9	10
clear table?	0	1	2	3	4	5	6	7	8	9	10
make your bed (not changing sheets)?	0	1	2	3	4	5	6	7	8	9	10
eat at someone else's home?	0	1	2	3	4	5	6	7	8	9	10

ID #_____ Date:_____ T1 T2 T3 T4

eat at a restaurant?	0	1	2	3	4	5	6	7	8	9	10
go to a neighborhood store?	0	1	2	3	4	5	6	7	8	9	10
go to a department store?	0	1	2	3	4	5	6	7	8	9	10
to out for an evening (movie, concert, etc.)?	0	1	2	3	4	5	6	7	8	9	10
go on a day trip (less than 100 miles)?	0	1	2	3	4	5	6	7	8	9	10
go on a short overnight trip?	0	1	2	3	4	5	6	7	8	9	10
return to *your* "normal" routine?	0	1	2	3	4	5	6	7	8	9	10

Appendix IX

ID #_____ Date:_____ T1 T2 T3 T4

Jenkins' Activity Checklist

GENERAL ACTIVITIES

	Yes	No	Not Applicable
brush teeth?			
take a shower?			
shampoo hair?			
get dressed (regular clothing)?			
write a letter/bill?			
empty small wastebasket?			
make a sandwich?			
clear table?			
make your bed (not changing sheets)?			
eat at someone else's home?			
eat at a restaurant?			
go to a neighborhood store?			
go to a department store?			
go out for an evening (movie, concert etc.)?			
go on a day trip (less than 100 miles)?			
go on a short overnight trip?			
return to *your* "normal" routine?			

Appendix X

ID #_____ Date:_____ T1 T2 T3 T4

Goal Setting Scale

Please mark the box that indicates how much you agree or disagree with the statement.

	Strongly Disagree	*Disagree*	*Neutral*	*Agree*	Strongly Agree
1. Setting goals is an important activity					
2. When I set goals I usually write them down.					
3. When I set goals, I also develop a plan for evaluating how well I have achieved the goals.					
4. I set goals on a regular basis.					
5. When I achieve a goal, I reward myself.					
6. I talk about my goals with others.					

Appendix XI

ID #_____ Date:_____ T1 T2 T3 T4

Barrier Efficacy Scale

The following items reflect situations that are listed as common reasons for preventing individuals from participating in exercise sessions or, in some cases, dropping out. Using the scales below please indicate how confident you are that you could exercise in the event that any of the following circumstances were to occur.

Please indicate the degree to which you are confident that you could exercise in the event that any of the following circumstances were to occur by circling the appropriate %. Select the response that most closely matches your own, remembering that there are no right or wrong answers.

For example, in question #1 if you have <u>complete confidence</u> that you could exercise even if "the weather was very bad," you would circle 100%. **If, however, you had <u>no confidence at all</u> that you could exercise, if you failed to make or continue making progress (that is, confidence you would not exercise),** you would circle 0%.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

NOT AT ALL CONFIDENT — MODERATELY CONFIDENT — HIGHLY CONFIDENT

I BELIEVE THAT I COULD EXERCISE 3 TIMES PER WEEK FOR THE NEXT 3 MONTHS IF:

1. The weather was very bad (hot, humid, rainy, cold).

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

ID #_____ Date:_____ T1 T2 T3 T4

Mark your answer by circling a %.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

NOT AT ALL CONFIDENT | MODERATELY CONFIDENT | HIGHLY CONFIDENT

I BELIEVE THAT I COULD EXERCISE 3 TIMES PER WEEK FOR THE NEXT 3 MONTHS IF:

2. I was bored by the program or activity.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

3. I was on vacation.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

4. I was not interested in the activity.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

5. I felt pain or discomfort when exercising.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

6. I had to exercise alone.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

7. It was not fun or enjoyable.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

8. It became difficult to get to the exercise location.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

ID #_____ Date:_____ T1 T2 T3 T4

Mark your answer by circling a %.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

NOT AT ALL CONFIDENT | MODERATELY CONFIDENT | HIGHLY CONFIDENT

I BELIEVE THAT I COULD EXERCISE 3 TIMES PER WEEK FOR THE NEXT 3 MONTHS IF:

9. I didn't like the particular activity program that I was involved in.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

10. My schedule conflicted with my exercise session.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

11. I felt self-conscious about my appearance when I exercised.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

12. An instructor does not offer me any encouragement.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

13. I was under personal stress of some kind.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Appendix XII

Using and Wearing Your Pedometer

BEGINNING THE DAY

Please start wearing the pedometer on Thursday morning _____

Wear it everyday while you are awake, until you remove it on Sunday night _____. Please bring the packet and pedometer with you to your exercise session on Monday morning _____.

Attach the pedometer to the waistband of your regular clothes (not pajamas).

Also, wait to attach it until after you have showered. The pedometer should ***never*** get wet!!

HOW TO WEAR YOUR PEDOMETER /

Using the clip attach the pedometer / step counter securely to your belt or waistband. For the best results keep it in line with the crease line of your pants. The best position, however, may be different for different body types. Keep in mind that the pedometer works most effectively when it is in a vertical position and level--much like a clock with a pendulum works best when the pendulum is kept in a vertical plane and the clock is level. Once you have secured the pedometer to your garment, attach the bulldog clip on your security strap to a belt loop, waistband, belt, etc. The security strap will act as a "safety net" for your pedometer.

ENDING THE DAY Remove the pedometer at bedtime.

REFERENCES

Ades, P. (1999). Cardiac rehabilitation in older coronary patients. *Journal of the American Geriatric Society, 47,* 98-105.

Ades, P. (2001). Cardiac rehabilitation and secondary prevention of coronary heart disease. *The New England Journal of Medicine, 345,* 892-902.

Ades, P., Waldmann, M., Polk, D., & Coflesky, J. (1992). Referral patterns and exercise response in the rehabilitation of female coronary patients aged >62 years. *American Journal of Cardiology,69,* 1422-1425.

Ainsworth, B. Haskell, W., Leon, A., et al. (1993). Compendium of physical activities: Classification of energy costs of human physical activities. *Medicine and Science in Sports and Exercise, 25,* 71- 80.

Ainsworth, B., Wilcox, S., Thompson, W., Richter, D., & Henderson, A. (2003). Personal, social, and physical environmental correlates of physical activity in African-American women in South Carolina. *American Journal of Preventive Medicine, 25*(3), S1, 23-29.

Allen, J. (1996). Coronary risk factor modification after coronary bypass surgery. *Nursing Research, 45*(5), 260-265.

Alonso, J., Permanyer-Miralda, G., Casant, P., Brotons, C., Prieto, L. & Soler-Soler, J. (1997). Measuring functional status of chronic coronary patients: Reliability, validity, and responsiveness to clinical change of the reduced version of the Duke Activity Status Index (DASI). *European Heart Journal, 30,* 992-1008.

American College of Sports Medicine. (1998). Exercise and physical activity for older adults. *Medicine and Science in Sports and Exercise,* 30(6), 992-1008.

American Heart Association. 2004 heart and stroke statistical update. Dallas, TX. American Heart Association, 2004.

Arnold, E. (1997). The stress connection: Women and coronary heart disease. *Critical Care Nursing Clinics of North America, 9, 565-575.*

Artinian, N. & Duggan, C. (1995). Sex differences in patient recovery patterns aftercoronary bypass surgery. *Heart & Lung, 24,* 483-494.

Bairey-Merz, C., Olson, M., McGorray, S., Pakstis, D., Zell, D., Zell, K., Rickens, C., Kelsey, S., Bittner, V., Sharaf, B., Sopoko, G. (2000). Physical activity and functional capacity measurement in women: A report from the NHLBI-sponsored WISE study. *Journal of Women's Health and Gender-based Medicine, 9,* 769-776.

Balady, Ades, Comoss et al., (2000). Core Components of Cardiac Rehabilitation/ Secondary Prevention Programs: A Statement for Healthcare Professionals from the American Heart Association and the American Association of Cardiovascular and Pulmonary Rehabilitation Writing Group Circulation. 102(9); 1069 –1073

Bandura, A. (1986). *Social foundations of thought and action, a social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1989). Regulation of cognitive processes through perceived self-efficacy. *Developmental Psychology, 25,* 729-735.

Bandura , A. (1990). Perceived self-efficacy in the exercise of personal agency. *Journal of Applied Sport Psychology, 2*, 128-163.

Bandura, A. (1995). Exercise of personal and collective efficacy in changing societies. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 1-45). New York: Cambridge University Press.

Barefoot, J., Helms, M., Mark, D., Blumenthal, J., Califf, R., Haney, T., O'Connor, C., Siegler, I., & Williams, R. (1996). Depression and long-term mortality risk in patients with coronary artery disease. *American Journal of Cardiology, 78*, 613-617.

Bassett, D., Cureton, A., & Ainsworth, B. (1999). Measurement of daily walking distance – questionnaire versus pedometer. *Medicine & Science In Sports & Exercise, 32,* 1018-1023.

Baumeister, R. Healtherton, T., Tice, D. (1994). *Losing control: How and why people fail at self-egulation.* San Diego, CA; Academic Press.

Benson, G., Arthur, H., & Rideout, E. (1997). Women and heart attack: A study of women's experiences. *Canadian Journal of Cardiovascular Nursing, 8*(3), 16-23.

Blair, S., Horton, E., Leon, A., Lee, I., Drinkwater, B., Dishman, R., Mackey, M., Kienholz, M. (1998). Physical activity, nutrition, and chronic disease. *Medicine & Science in Sports & Exercise, 28,* 335-349.

Blanchard, C., Rodgers, W., Courneya, K., Daub, B., & Knapik, G. (2001). Does exercise barrier efficacy mediate the gender-exercise adherence relationship during Phase II cardiac rehabilitation? *Rehabilitation Psychology, 47*(1), 106-120.

Brezinka, V., Dusseldorp, E., & Maes, S. (1998). Gender differences in psychosocial profile at entry into cardiac rehabilitation. *Journal of Cardiopulmonary Rehabilitation, 18, 445-449.*

Brezinka, V. & Kittel, F. (1995). Psychosocial factors of coronary heart disease in women: a review. *Social Science & Medicine, 42*, 1351- 1365.

Brown, K. & Moskowitz, D. (1998). It's a function of time: a review of the process approach to behavioral medicine research. *Annals of Behavioral Medicine, 20,* 109-117.

Brummett, B., Babyak, M., Barefoot, J., Bosworth, H., Clapp-Channing, N., Siegler, I., Williams, R., & Mark, B. (1998). Social support and hostility as predictors of depressive symptoms in cardiac patients one month after hospitalization: a prospective study. *Psychosomatic Medicine, 60,* 707-713.

Buunk, B. (1995). Comparison direction and comparison dimension among disabled individuals: Towards a refined conceptualization of social comparison under stress. *Personality and Social Psychology Bulletin,* 21, 316-330.

Buunk B, Gibbons,F. & Visser, A. (2002). The relevance of social comparison processes for prevention and health care. *Patient Education & Counseling, 47,* 1-3.

Campbell, D. & Stanley, J. (1963). *Experimental and quasi-experimental designs for research.* Boston: Houghton Mifflin Co.

Cannistra, L., Balady, G., O'Malley, C., Weiner, D., & Ryan, T. (1992). Comparison of the clinical profile and outcome of women and men in cardiac rehabilitation. *The American Journal of Cardiology, 69,* 1274-1279.

Carlson, J., Norman, G., Feltz, D., Franklin, B., Johnson, J. & Locke, S. (2001). Self-efficacy, psychosocial factors, and exercise behavior in traditional versus modified cardiac rehabilitation. *Journal of Cardiopulmonary Rehabilitation, 21,* 363-373

Carroll, D. (1995). The importance of self-efficacy expectations in elderly patients recovering from coronary artery bypass surgery. *Heart & Lung, 24,* 50-59.

Case, R., Moss, A., Case, N., McDermott, M. & Eberly, S. (1992). Living alone after myocardial infarction: Impact on prognosis. *JAMA, 267,* 515-519.

Casper, M., Barnett, E., Halverson, J., Elmes, G., Braham, V., Majeed, Z., Bloom, A., & Stanley, S. (2001). Women and heart disease: An atlas of racial and ethnic disparities in mortality (2nd Ed.). Centers for Disease Control and Prevention; West Virginia University.

Caspersen, C & Merritt, R. (1995). Physical activity trends among 26 states, 1986 – 1990. *Medicine & Science in Sports & Exercise, 27,* 713 – 720.

Castro, C.; Wilcox, S.; O'Sullivan, P.; Baumann, K.; &; King, A. (2002). An exercise program for women who are caring for relatives with dementia. *Psychosomatic Medicine, 64,* 458- 468.

Centers for Disease Control and Prevention. (1993). Prevalence of sedentary lifestyle-behavioral risk factor surveillance system, United States, 1991. *MMWR, 42,* 576-579.

Charmaz, K. (1991). *Good days, bad days: The self in chronic illness and time.* New Brunswick, NJ: Rutgers University Press.

Charmaz, K. (1999). Stories of self in illness. In R. Contrada & R. Ashmore (Eds.) Self, social identity, and physical health. *Rutgers Series on Self and Social Identity, 2,*209-235.

Chesney, M. & Darbes, L. (1998). Social support and heart disease in women: Implications for intervention. In: K. Orth-Gomer, M. Chesney, & N. Wenger (Eds.). *Women, stress, and heart disease.* Mahwah, NJ: L. Erlbaum Assoc.

Clark, N. & Dodge, J. (1999). Exploring self-efficacy as a predictor of disease management. *Health Education & Behavior, 26,* 72-89.

Clark, N., Janz, N., Dodge, J., Schork, M., Fingerlin, T, Wheeler, J., Liang, J., Keteyian, S., & Santiga, J. (2000). Changes in functional health status of older women with heart disease: Evaluation of a program based on self-regulation. *Journal of Gerontology: SOCIAL SCIENCES, 55B*(2), S117-S126.

Clark, D. & Nothwehr, F. (1999). Exercise self-efficacy and its correlates among socioeconomically disadvantaged older adults. *Health Education & Behavior, 26,* 535-546.

Cloutier Laffery, S. (2000). Physical activity among older Mexican American women. *Research in Nursing & Health, 23,*383-392.

Collins, R. (1996). For better or worse: The impact of upward social comparison on self-evaluations. *Psychological Bulletin, 119,* 51-69.

Conn, V. (1998). Older adults and exercise: Path analysis of self-efficacy related constructs. *Nursing Research, 47,* 180-189.

Conn, V, Burks, K, Pomeroy, S., Ulbrich, S., & Cochran, M (2003). Older women and exercise: Explanatory concepts. *Women's Health Issues, 13* 158-66.

Conn, V., Taylor S., & Abele, P. (1991). Myocardial infarction survivors: Age and gender differences in physical health, psychosocial state, and regimen adherence. *Journal of Advanced Nursing, 16*, 1026-1034.

Conn, V., Tripp-Reimer, T., & Maas, M. (2003). Older women and exercise: Theory of planned behavior beliefs. *Public Health Nursing, 20,* 153-163.

Cook, T. & Campbell D. (1979). *Quasi-experimentation: Design and analysis issues for field settings.* Boston: Houghton Mifflin Company.

Cooper, A., Lloyd, G., Weinmen, J., & Jackson, G. (1999). Why patients do not attend cardiac rehabilitation: role of intentions and illness beliefs. *Heart, 82,* 234-236.

Courneya, K. (1999). Understanding readiness for regular physical activity in older individuals: An application of the theory of planned behavior. *Health Psychology, 14,* 80-87.

Cousins, S.O. (2000). "My heart couldn't take it: Older women's beliefs about exercise benefits and risks. *Journal of Gerontology: Psychological Sciences, 55B,* P283- 294.

Crane, P., Letvak, S., Lewallen, L., Hu, J., & Jones, E. (2004). Inclusion of women in nursing research: 1995-2001. *Nursing Research, 54,* 237-242.

Cronin, S., Logsdon, C., & Miracle, V. (1997). Psychosocial and functional outcomes in women after coronary artery bypass surgery. *Critical Care Nurse, 17,* 19-26.

Crouter, S., Schneider, P., Karabulut, M., & Bassett, D. (2003). Validity of 10 electric pedometers for measuring steps, distance, and energy costs. *Medicine & Science in Sports & Exercise,35,* 1455-1460.

Cuaderes, E., Parker, D., & Burgin, C. (2004). Leisure time physical activity in adult Native Americans. *Southern Online Journal of Nursing Research,5*(1), 1-17, Retrieved on December 22, 2005 from www.snrs.org/publications/SOJNR_articles/iss01vol05.pdf

Curran, S., Andrykowski, M., & Studts, J. (1995). Short form of the Profile of Mood States (POMS-SF): Psychometric information. *Psychological Assessment, 7,* 80-83.

Dellasega, C. & Fisher, K. (2001). Post-hospital home care for frail older adults in rural locations. *Journal of Community Health Nursing, 18,* 247-260.

Dishman, R. (1990). Determinants of participation in regular physical activity. In C. Bouchard, R. Shephard, T. Stephens, J. Sutton, & B. McPherson (Eds.), *Exercise, fitness, and health.* Champagne, IL: Human Kinetics Publishers, 75-102.

Dishman, R. & Buckworth, J. (1996). Increasing physical activity: a quantitative synthesis. *Medicine & Science in Sports & Exercise, 28*, 706-719.

Dixon, T., Lim, L., Powell, H., & Fisher, J. (2000). Psychosocial experiences of cardiac patients in early recovery: a community based study. *Journal of AdvancedNursing, 31*, 1368-1375.

Evenson, K., Rosamond, W., & Luepker, R. (1998). Predictors of outpatient cardiac rehabilitation utilization: The Minnesota Heart Survey Registry. *Journal of Cardiopulmonary Rehabilitation,18,* 192-198.

Ewart.C. (1991). Social action theory for a public health psychology. *American Psychologist, 9,* 931-946.

Eylar, A., Mattson-Koffman, D., Young, D., Wilcox, S., Wilbur, J., Thompson, J., Sanderson, B. & Evenson, K. (2003). Quantitative study of correlates of physical activity in women from diverse racial/ethnic groups: The Women's Cardiovascular Health Network Projectsummary and conclusions. *American Journal of Preventive Medicine,25*(3)Supp 1, 93-103.

Fallon, E., Wilcox, S., & Ainsworth, B. (2005). Correlates of self-efficacy for physical activity in African American women. *Women Health, 41*(3), 47-62.

Farmer, I., Meyer, P., Ramsey, D., Goff, D., Wear, M., Labarthe, D., & Nichaman, M. (1996). Higher levels of social support predict greater survival following acute myocardial infarction: The Corpus Christi Heart Project. *Behavioral Medicine,22,* 59-66.

Fletcher, G., Balady, G., Blair, S., Blumenthal, J., Caspersen, C., Chaitman, B., Epstein, S., Sivarajan Froelicher, E., Froelicher, V., Pina, I., & Pollock, M. (1996). Statement on exercise: Benefits and recommendations for physical activity programs for all Americans. *Circulation, 94*(4), 857-862.

Fleury, J. (1991). Empowering potential: a theory of wellness motivation. *Nursing Research 40*(5), 286- 291.

Fleury, J. (1992). The application of motivational theory to cardiovascular risk reduction. *Image:Journal of Nursing Scholarship, 24*(3), 229-239.

Fleury, J. (1993). An exploration of the role of social networks in cardiovascular risk reduction. *Heart & Lung,* 22, 134-144.

Fleury, J. (1995). *Determinants of motivation in regular physical exercise: a test of the wellness motivation theory.* Unpublished manuscript.

Fleury, J. (1996). Wellness motivation theory: An exploration of theoretical relevance. *Nursing Research, 45*(5), 277-283.

Fleury, J. (1998). The Index of Self-regulation: development and psychometric analysis. *Journal of Nursing Measurement, 6,* 3-17.

Fleury, J. & Cameron- Go, K. (1997). Women's rehabilitation and recovery. *Critical Care Clinics of North America*, 9, 577- 588.

Fleury, J., Harrell, J., & Cobb, B. (2001). Regular physical activity in older African-Americans. In S. Funk, E. Tornquist, J. Leeman, M. Miles, & J. Harrell (Eds). *Key aspects of preventing and managing chronic illness.* NY: Springer Publishing

Fleury, J., Kimbrell, C., & Kruszewski, M.A. (1995). Life after a cardiac event: Women's experiences in healing. *Heart & Lung,* 24, 474- 482.

Fleury, J., Lee, S., Matteson, B., & Belyea, M. (2004). Barriers to physical activity maintenance after cardiac rehabilitation. *Journal of Cardiopulmonary Rehabilitation, 24,* 296 – 307.

Fleury J., Sedikides, C., & Lunsford, V. (2001). Women's experience following a cardiac event: the role of the self in healing. *Journal of Cardiovascular Nursing, 15*(3), 71- 82.

Fleury, J., Thomas, T., & Ratledge, K. (1997). Promoting wellness in individuals with coronary heart disease. *Journal of Cardiovascular Nursing, 11*(3), 26 –42.

Foster, C. Oldridge, N., Dion, W., Forsyth. G., Grevenow, P., Hansen, M., Laughlin, J., Plichta, C., Rabas, S., Sharkey, R., & Schmidt, D. (1995). Time course of recovery during cardiac rehabilitation. *Journal of Cardioplumonary Rehabilitation, 15,* 209-215.

Frasure-Smith, N., Lesperance, F., & Talajic, M. (1993). Depression following myocardial infarction: impact on 6-month survival. *JAMA, 270,* 1819-25.

Frasure-Smith, N., Lesperance, F. & Talajic, M. (1995). The impact of negative emotions on prognosis following myocardial infarction: Is it more than depression? *Health Psychology, 14,* 388- 398.

Garber, C. (1997). The benefits of physical activity on coronary heart disease and coronary heart disease risk factors in women. *Women's Health Issues, 7,* 17-23.

Gardner, J., McConnell, T., Klinger, T., Herman, C., Hauck, C., & Laubach, C. (2003). Quality of life and self-efficacy. *Journal of Cardiopulmonary Rehabilitation, 23,*299-306.

Gibbons, F. (1999). Social comparison as a mediator of response shift. *Social Science and Medicine, 48, 1517 – 1530.*

Gillis, A. J. (1993). Determinants of a health-promoting lifestyle: An integrated review. *Journal of Advanced Nursing, 18*, 345-353.

Gillis, C., Gortner, S., Hauck, W., Shinn, J., Sparacino, P., and Tompkins, C. (1993). A randomized clinical trial of nursing care for recovery from cardiac surgery. *Heart & Lung, 22*(2), 125-133.

Giordano, C., Wood, J., & Michela, J. (2000). Depressive personality styles, dysphoria, and social comparisons in everyday life. *Journal of Personality and Social Psychology, 79,* 438-451.

Gollwitzer, P. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist, 54,* 493-503.

Gordon, N. & Haskell, W. (1997). Comprehensive cardiovascular disease risk reduction in a cardiac rehabilitation setting. *American Journal of Cardiology, 80*(8B), 69H-73H.

Gortner, S. & Jenkins, L. (1990). Self-efficacy and activity level following cardiac surgery. *Journal of Advanced Nursing, 15,* 1132-1138.

Graves K. & Miller, P. (2003). Behavioral medicine in the prevention and treatment of cardiovascular disease. *Behavior Modification, 27,* 3-25.

Guiry, E., Conroy, R., Hickey, N., & Mulcahy, R. (1987). Psychological response to acute coronary event and its effect on subsequent rehabilitation and lifestyle change. *Clinical Cardiology, 10,* 256-260.

Guyatt, G., Sullivan, M., Thompson, P., Fallen, E., Pugsley, R., Taylor, D., & Berman, L. (1985). The 6-minute walk test: a new measure of exercise capacity in patients with chronic heart failure. *Canadian Medical Association Journal, 132,* 919-923.

Hamilton, G. (1990). Recovery from acute myocardial infarction in women. *Cardiology,77* (suppl 2), 58-70.

Hamilton, G. & Seidman, R. (1993). A comparison of recovery period for women and men after an acute myocardial infarction. *Heart & Lung, 22, 308-15.*

Haskell, W. (1994). The efficacy and safety of exercise programs in cardiac rehabilitation. *Medicine and Science in Sports and Exercise, 26,* 815-823.

Haskell, W., Alderman, E., Fair, J., et al. (1994). Effects of intensive multiple risk factor reduction on coronary atherosclerosis and clinical cardiac events in men and women with coronary artery disease. The Stanford Coronary Risk Intervention Project (SCRIP). *Circulation, 89*, 975- 990.

Hedbeck, B., Perk, J., & Wodlin, P. (1993). Long-term reduction of cardiac mortality after myocardial infarction: 10-year results of a comprehensive rehabilitation programme. *European Heart Journal, 14,* 831- 835.

Heidrich, S. & Ryff, C. (1993a). The role of social comparisons processes in the psychological adaptation of elderly adults. *Journal of Gerontology:PSYCHOLOGICAL SCIENCES, 48,* P127-P136.

Heidrich, S. & Ryff, C. (1993b). Physical and mental health in later life: The self-system as mediator. *Psychology and Aging, 8,* 327-338.

Helgeson, V. & Mickelson, K. (1992). Motives for social comparisons. *Personality and Social Psychology, 21,* 1200 – 1209.

Helgeson, V. & Taylor, S. (1993). Social comparisons and adjustment among cardiac patients. J*ournal of Applied Social Psychology, 23,* 1171-1195.

Hellman, E. (1997). Use of the stages of change in exercise adherence model among older adults with a cardiac diagnosis. *Journal of Cardiopulmonary Rehabilitation,17*, 145-155.

Helpard, H. & Meagher-Stewart, D. (1998). The "kaleidoscope" experience for elderly women living with coronary artery disease. *Canadian Journal of Cardiovascular Nursing,* 9(3),11-23.

Hevey, D., Brown, A., Cahill, A., Newton, H., Kierns, M., Horgan, J. (2003). Four-week multidisciplinary cardiac rehabilitation produces similar improvements in exercise capacity and quality of life to a 10-week program. *Journal of Cardiopulmonary Rehabilitation, 23,* 17-21.

Hlatky, M., Boineau, R., Higginbotham, M., Lee, K., Mark, D., Califf, R., & Cobb, F. (1989). A brief self-administered questionnaire to determine functional capacity (The Duke Activity Status Index). *American Journal of Cardiology, 64, 651-654.*

Hlatky, M., Boothroyd, D., Vittinghoff, E., Charp, P., & Wholley, M. (2002). Quality of life and depressive symptoms in postmenopausal women after receiving hormone therapy. *JAMA, 287,* 591-597.

Holden, G. (1991). The relationship of self-efficacy appraisals to subsequent health-related outcomes: A meta-analysis. *Social Work in Health Care, 16*, 53-93.

Hollenberg, M., Haight, T., & Tager, I. (2003). Depression decreases cardio-respiratory fitness in older women. *Journal of Clinical Epidemiology, 56*, 1111-1117.

Houston-Miller, N., Taylor, B., Davidson, D., Hill, M., & Krantz, D. (2000). Position Paper of the American Association of Cardiovascular and Pulmonary Rehabilitation: The efficacy of risk factor intervention and psychosocial aspects of cardiac rehabilitation. *Circulation, 102,* 1069-1073.

Izawa, K., Hirano, Y., Yamada, S., Oka, K., Omiya, K. & Iijima, S. (2004). Improvement in physiologic outcomes and health-related quality of life following cardiac rehabilitation in patients with acute myocardial infarction. *Circulation Journal 68,* 315-320.

Jenkins, L. (1989). Jenkins instruments: Self-Efficacy Expectations and Scales and Activity Check-Lists for selected cardiac recovery behaviors. Unpublished manuscript, University of Maryland.

Jenkins, L. & Gortner, S. (1998). Correlates of self-efficacy expectation and prediction of walking behavior in cardiac surgery elders. *Annals of Behavioral Medicine, 20,* 99- 103.

Johnson, J. & Morse, J. (1990). Regaining control: The process of adjustment after myocardial infarction. *Heart & Lung,* 19, 126-35.

Kavanagh, T., Mertens, D., Hamm, L., Beyene, J., Kennedy, J., Corey, P. & Shephard, R. Peak oxygen intake and cardiac mortality in women referred for cardiac rehabilitation. *Journal of the American College of Cardiology, 42,* 2139-2143.

Kearney, M. (1999). Understanding women's recovery from illness and trauma. In B. Okun (Ed.), *Women's Mental Health & Development: Vol. 4.* Thousand Oak, CA: Sage.

Keller, C & Thomas, K. (1995). Measurement of body fat and fat distribution. *Journal of Nursing Measurement, 3,* 159-174.

Kemmelmeier, M. & Oyeserman, D. (2001). Gendered influences of downward comparisons On current and possible selves. *Journal of Social Issues, 57,* 129 – 148.

Kimble, L. (2001). Impact of cardiac symptoms on self-reported household task performance in women with coronary artery disease. *Journal of Cardiopulmonary Rehabilitation, 21,* 18- 23.

King, K. (1997). Psychologic and social aspects of cardiovascular disease. *Annals of Behavioral Medicine, 19,* 264-270.

King, K., Clark, P., & Friedman, M. (1999). Social comparisons and temporal comparisons after coronary artery surgery. *Heart & Lung, 28,* 316-325.

King, K., Porter, L., & Rowe, M. (1994). Functional, social, and emotional outcomes in women and men in the first year following coronary artery bypass surgery. *Journal of Women's Health, 3,* 347-354.

King, K., Quinn, J., Delehanty, J., Rizzo, S., Eldredge, D., Caufield, L., & Ling, F. (2002). Perception of risk for coronary heart disease in women undergoing coronary angiography. *Heart & Lung, 31,* 246-252.

King, K., Reis, H., Porter, L., & Norsen, L. (1993). Social support and long-term recovery from coronary artery surgery: Effects on patients and spouses. *Health Psychology, 12,* 56-63.

King, K., Rowe, M., & Zerwick, J. (2000). Concerns and risk factor modification in women during the year after coronary artery surgery. *Nursing Research, 49,* 167-172.

Kline Leidy, N., Ozbolt, J., & Swain, M.A. (1990). Psychophysiological processes of stress in chronic illness: a theoretical perspective. *Journal of Advanced Nursing, 15*, 478-86.

Knox, S., Adelman, A., Ellison, C., Arnett, D., Siegmund, K., Weidner, G., & Province, M. (2000). Hostility, social support, and carotid artery atherosclerosis in The National Heart, Lung, and Blood Institute Family Heart Study. *The American Journal of Cardiology, 86,* 1086-1089.

Krummel, D., Matson-Koffman, D., Bronner, Y., Davis, J., Greenlund, K., Tessaro, I., Upson,D., & Wilson, J. (2001). Cardiovascular health interventions in women: What works? *Journal of Women's Health & Gender-based Medicine, 10*, 117-134.

Kulik, J. & Mahler, H. (1989). Stress and affiliation in a hospital setting: Preoperative roommate preferences. *Personality and Social Psychology Bulletin, 15,* 183-193.

Kulik, J. & Mahler, H. (1997). Social comparison, affiliation, and coping with acute medical threats. In B. Buunk & F. Gibbons (Eds.). *Health, coping, and wellbeing: Perspectives from social comparison theory,* 227-261. Mahwah, NJ: Erlbaum.

Kulik, J., Mahler, H., & Earnest, A (1994). Social comparison and affiliation under threat: Going beyond the affiliate choice paradigm. *Journal of Personality and Social Psychology, 66,* 301-309.

Kulik, J., Mahler, H., & Moore, P. (1996). Social comparison and affiliation under threat: Effectson recovery from major surgery. *Journal of Personality and SocialPsychology, 71,* 967-979.

LaCharity, L. (1997). The experiences of postmenopausal women with coronary artery disease. *Western Journal of Nursing Research, 19,* 583-607.

Ladwig, K., Roll, G., Breithardt, G., Budde, T., & Borggrefe, M. (1994). Post-infarction depression and incomplete recovery 6 months after acute myocardial infarction. *Lancet, 343*(8):20-3.

Lavie, C. & Milani, R. (1995). Effects of cardiac rehabilitation and exercise training on exercise capacity, coronary risk factors, behavioral characteristics, and quality of life in women. *The American Journal of Cardiology, 75,* 340 – 343.

Lear, S., Ignaszewski, A., Laquer, E., Pritchard, R.H., & Frolich, J. (2001). Extensive lifestyle management intervention following cardiac rehabilitation: A pilot study. *RehabilitationNursing, 26*(6), 227 – 232.

Lee, Y. (2005). Gender differences in physical activity and walking among older adults. *Journal of Women & Aging, 17,* 55-70.

Lemanski, K. (1990). The use of self-efficacy in cardiac rehabilitation. *Progress in Cardiovascular Nursing, 5*(4), 114-117.

Le Masurier, G., Lee, S., & Tudor-Locke, C. (2004). Motion sensor accuracy under controlled and free-living conditions. *Medicine & Science In Sports & Exercise,36,* 905-910.

Le Masurier, G. & Tudor-Locke, C. (2003). Comparison of pedometer and accelerometer accuracy under controlled conditions. *Medicine & Science In Sports & Exercise,35,* 867-871.

Lerman, C. & Glanz, K. (1997). Stress, coping, and health behavior. In K. Glanz, F. Lewis, & B. Rimer (Eds.), *Health Behavior and Health Education*. (2nd ed.). (pp. 113-138). San Francisco: Josey-Bass.

Lieberman, L., Meana, M., & Stewart, D. (1998). Cardiac rehabilitation: Gender differences in factors influencing participation. *Journal of Women's Health, 7,* 717- 723.

Linden, W., Stossell, C., & Maurice, J. (1996). Psychosocial interventions for patients with coronary artery disease; a meta-analysis. *Archives of Internal Medicine, 156,* 745-752.

Lipsey, M. (1993). Theory as method: Small theories of treatment. *New directions for program planning, 57,* pp. 5- 38.

Litt, M., Kleppinger, A., & Judge,J. (2002). Initiation and maintenance of exercise behavior in older women: Predictors from the Social Learning Model. *Journal of Behavioral Medicine, 25*, 83-97.

Low, K. (1993). Recovery from myocardial infarction and coronary artery bypass surgery in women: psychosocial factors. *Journal of Women's Health, 2,* 133- 139.

Lunsford, V. (2000) A Metasynthesis of Qualitative Research on Women Living with CoronaryHeart Disease. *Proceedings: Southern Nursing Research Society 14th Annual Conference,* Little Rock, Ark.

McAuley, E. (1992). The role of efficacy cognitions in the prediction of exercise behavior in middle-aged adults. *Journal of Behavioral Medicine, 15*, 65-88.

McAuley, E. (1993). Self-efficacy and the maintenance of exercise participation in older adults. *Journal of Behavioral Medicine, 16*, 103-113.

McAuley, E., Jerome, G., Elavsky, S., Marquez, D. & Ramsey, S. (2003). Predicting long-termmaintenance of physical activity in older adults. *Preventive Medicine, 37,* 110-118.

McAuley, E., Jerome, G., Marquez, D., Elavsky, S., & Blissmer, B. (2003). Exercise self efficacy in older adults: Social, affective, and behavioral influences. *Annals of Behavioral Medicine, 25,* 1-7.

Marchionni, N., Fattirolli, F., Fumagalli, S., Oldridge, N., Del Lungo, F., Bonechi, F., Russo, L. et al. (2000). Determinants of exercise tolerance after acute myocardial infraction in older persons. *Journal of the American Geriatric Society, 48*(2), 146-153.

Marcuccio, E., Loving, N., Bennett, S., & Hayes S. (2003). A survey of attitudes and experiences of women with heart disease. *Women's Health Issues, 23,* 23-31.

Marcus, B., Dubbert, P., Forsyth, L., McKenzie, T., Stone, E., Dunn, A., & Blair, S. (2000). Physical activity behavior change: Issues in adoption and maintenance. *Health Psychology, 19*(1), 32-41.

Markus, H. & Nurius, P. (1986). Possible selves. *American Psychologist, 41*, 954-969.

Markus, H. & Ruvulo, A. (1989). Possible selves: Personalized representations of goals. In: L. Pervin (Ed.). *Goal concepts in personality and social psychology.* Hillsdale, NJ. Lawrence Erlbaum, 211-241.

Mayou, R., Gill, D. Thompson, D., Day, A., Hicks, N., Volmink, J. & Neil, A. (2000). Depression and anxiety as predictors of outcomes after myocardial infarction. *Psychosomatic Medicine* 62, 212–219.

Miller, N. (1997). Compliance with treatment regimens in chronic asymptomatic diseases. *American Journal of Medicine, 102*, 43–49.

Miller, T., Balady, G., & Fletcher, G. (1997) Exercise and its role in the prevention and Rehabilitation of cardiovascular disease. *Annals of Behavioral Medicine, 19,* 220-229.

Missik, E. (1999) Personal perceptions and women's participation in cardiac rehabilitation. *Rehabilitation Nursing, 24*(4), 158-165.

Mo-Kyung, S., Sanderson, B., Weaver, M., Giger, J., Pemberton, J., & Klapow, J. (2004). Personal characteristics, health status, physical activity, and quality of life in cardiac rehabilitation participants. *International Journal of Nursing Studies 41*(2), 173-181.

Moore, S. (1997). Effects of interventions to promote recovery in coronary artery bypass surgical patients. *Journal of Cardiovascular Nursing, 12*(1), 59-70.

Moore, S., Dolansky, M., Ruland, C., Pashkow, F. & Blackburn, G. (2003). Predictors of women's exercise maintenance after cardiac rehabilitation. *Journal of Cardiopulmonary Rehabilitation, 23,* 40-49.

Moore, S. & Kramer, F. (1996). Women's and men's preference for cardiac rehabilitation program features. *Journal of Cardiopulmonary Rehabilitation, 16,* 163- 168.

Moore, S., Dolansky, Ruland, C., Pashkow, F., & Blackburn, G (1998). Women's patterns of exercise following cardiac rehabilitation. *Nursing Research, 47,* 318-324.

Morgan, W. (1997). Depression and exercise therapy. In W. P. Morgan (Ed.). *Physical Activity and Mental Health: Series in Health Psychology and Behavioral Medicine.* Washington, DC: Taylor & Francis.

Mosca, L., McGillen, C., Rubenfire, M. (1998). Gender differences in barriers to lifestyle change for cardiovascular disease prevention. *Journal of Women's Health, 7*, 711- 715.

Moser, D. (1994). Social support and cardiac recovery. *Journal of Cardiovascular Nursing, 9,* 27-36.

Murray, S., Manktelow, K., & Clifford, C. (2000). The interplay between social and cultural context and perceptions of cardiovascular disease. *Journal of Advanced Nursing, 32,* 1224-1233.

Murray, J., O'Farrell, P., Houston, P. (2000). The experiences of women with heart disease what are their needs? *Canadian Journal of Public Health, 91*(2), 98-102.

Nies, M., Hepworth, J., Wallston, K., & Kershaw, T. (2001). Evaluation of an instrument for assessing behavioral change in sedentary women. *Journal of Nursing Scholarship, 33,*349-354.

Nies, M. & Kershaw, T. (2002). Psychosocial and environmental influences on physical activity and health outcomes in sedentary women. *Journal of Nursing Scholarship, 34,* 243-249.

O'Brien Cousins, S. (2000). "My heart couldn't take it": Older women's beliefs about exercise benefits and risks. *Journal of Gerontology: PSYCHOLOGICAL SCIENCES, 5B*(5), P283-P294.

Oldridge, N. (1991). Compliance with cardiac rehabilitation services. *Journal of Cardioplumonary Rehabilitation, 11,* 115-119.

Oldridge, N., Guyatt, G., Crowe, J., Feeny, D. & Jones, N. (1999). Goal attainment in a randomized control trial of rehabilitation after myocardial infarction. *Journal of Cardiopulmonary Rehabilitation, 19,* 29-34.

Oliver-McNeil, S. & Artinian, N. (2002). Women's perceptions of personal cardiovascular risk and their risk-reducing behaviors. *American Journal of Critical Care, 11, 221-227.*

Parent, N. & Fortin, F. (2000). A randomized, controlled trial of vicarious experience through peer support for male first-time cardiac surgery patient: impact on anxiety, self-efficacy expectation, and self-reported activity. *Heart & Lung, 31,* 399-410.

Pate, R., Pratt, M., Blair, S., Haskell, W., Macera, C., Bouchard, C., et al. (1995). Physical activity and public health: A recommendation from the Centers for Disease Control and

Prevention and the American College of Sports Medicine. *JAMA: Journal of the American Medical Association, 273,* 402-407.

Patton, M. (1990). *Qualitative evaluation and research methods (2nd Ed.).* NY: Sage

Peplau, H. (1997). Theory: The professional dimension. In: Nicoll, L. (Ed.). *Perspectives on nursing theory (3rd Ed.).* PG#NY: Lippincott-Raven Publishers.

Pinsky, J., Jette, A., Branch, L., Kannel, W., & Feinleib, M. (1990). The Framingham Disability Study. Relationship of various coronary heart disease manifestations to disability in older persons living in the Community. *American Journal of Public Health, 80*, 1363-1368.

Prochaska, J. & DiClemente, C. (1983). Stages and processes of self-change in smoking: Towards an integrative model of change. *Journal of Consulting and Clinical Psychology,51,* 390–395.

Rankin, S. (1990). Differences in recovery from cardiac surgery: a profile of male and female patients. *Heart & Lung, 19,* 481-485.

Rankin, S. (1995). Going it alone: Women managing recovery from acute myocardial infarction. *Family & Community Health, 17*(4), 50-62.

Rankin, S. (2002). Women recovering from acute myocardial infarction: Psychosocial and physical functioning outcomes 12 months after acute myocardial infarction. *Heart & Lung, 31,* 399-410.

Rejeski, W., Brawley, L., Ambrosius, W., Brubaker, P., Focht, B., Foy, C., & Fox, L. (2003). Older adults with chronic disease: Benefits of group-mediated counseling in the promotion of physically active lifestyles. *Health Psychology, 22,* 414-423.

Resnick, B. (2001a). Testing a model of exercise behavior in older adults. *Research in Nursing & Health, 24*, 83-92.

Resnick, B. (2001b). Testing a model of overall activity in older adults. *Journal of Aging & Physical Activity, 9,* 142-160.

Resnick, B. & Jenkins, L. (2000). Testing the reliability and validity of the Self-Efficacy for Exercise Scale. *Nursing Research, 49,* 154-159.

Resnick, B. & Nigg, C. (2003). Testing a theoretical model of exercise behavior for older adults. *Nursing Research, 52,* 80-88.

Resnick, B., Palmer, M., Jenkins, L., & Spellbring, A. (2000). Path analysis of efficacy expectations and exercise behaviour in older adults. *Journal of Advanced Nursing, 31,* 1309-1315.

Riegel, B. & Gocka, I. (1995). Gender differences in adjustment to acute myocardial infarction. *Heart & Lung, 24,* 457- 466.

Robertson D. & Keller C. (1992). Relationships among health beliefs, self-efficacy, and exercise adherence in patients with coronary artery disease. *Heart & Lung, 21,*60-63.

Rose, G., Suls, J., Green, P., Lounsbury, P., & Gordon, E. (1996). Comparison of adjustment, activity, and tangible social support in men and women patients and their spouses during six months post-myocardial infarction. *Annals of Behavioral Medicine, 18,* 264-272.

Sallis, J., Johnson, M., Calfas, K., Caparosa S. & Nichols, J. (1997). Assessing perceived physical environment variables that may influence physical activity. *Research Quarterly in Exercise and Sports, 68,* 345–351.

Sandelowki, M. (2000). Combining qualitative and quantitative sampling, data collection, and analysis techniques in mixed-method studies. *Research in Nursing and Health, 23,* 246 – 255.

Schneider, P., Crouter, S., & Bassett, D. (2004). Pedometer measures of free-living activity: Comparison of 13 models. *Medicine & Science In Sports & Exercise, 36,* 331-335.

Shacham, S. (1983). A shortened version of the Profile of Mood States. *Journal of Personality Assessment, 47,* 305-306.

Sharma, M., Sargent, L., & Stacy, R. (2005). Predictors of leisure-time physical activity among African women. *American Journal of Health Behavior, 29,* 352-359

Sherwood, N. & Jeffery, R. (2000). The behavioral determinants of exercise: Implications for physical activity interventions. *Annual Review of Nutrition, 10,* 21-44.

Sidani, S. Braden, C. (1998). *Evaluating nursing interventions: a theory-driven approach.* Thousand Oaks, CA. Sage.

Song, R. & Lee, H. (2001). Effects of a 12-week cardiac rehabilitation exercise program on motivation and health-promoting lifestyle. *Heart & Lung, 30,* 200-209.

Speroff, L. (1993). Menopause and hormone replacement therapy. *Clinics in Geriatric Medicine,* 9(1), 33-55.

Sprangers, M. & Schwartz, C. (1999). Integrating response shift into health-related quality of life research: a theoretical model. *Social Science and Medicine, 48,* 1507 – 1515.

Stanton, A., Danoff-Burg, S., Snider, P., Cameron, C. & Kirk, S. (1999). Social comparison and adjustment to breast cancer: an experimental examination of upward affiliation and downward evaluation. *Health Psychology, 18,* 151-158.

Sun, Y. & Croyle, R. (1995). Level of health threat as a moderator of social comparison Preferences. *Journal of Applied Social Psychology, 25,* 1937-1952.

Tallaj, J., Sanderson, B., Breland, J., Adams, C., Schumann, C., & Bittner, V (2001). Assessmentof functional outcomes using the 6-minute walk test in cardiac rehabilitation: Comparison of patients with and without left ventricular dysfunction. *Journal of Cardiopulmonary Rehabilitation, 21,* 221-224.

Taylor, S., Buunk, B., & Aspinwall, L. (1990). Social comparison, stress, and coping. *Personality and Social Psychology Bulletin, 16,* 74-89.

Taylor, S. & Schneider, S. (1989). Coping and simulation of events. *Social Cognition 7*(2), 174- 194.

Tennen, H., McKee, T., & Affleck, G. Social comparison processes in health and illness. In J. Suls & L. Wheeler (Eds.), *Handbook of social comparison: Theory and research* (pp. 443-483). NY: Kluwer Academic/ Plenum Publishers.

Toobert, D., Glasgow, R., Nettekoven, L., & Brown, J. (1998). Behavioral and psychosocial effects of intensive lifestyle management for women with coronary heart disease. *Patient Education and Counseling, 35,* 177-188.

Tudor-Locke, C., Williams, J., Reis, J., & Pluto, D. (2002). Utility of pedometers for assessing physical activity: Convergent validity. *Sports Medicine, 32,* 795-808.

Tudor-Locke, C., Williams, J., Reis, J., & Pluto, D. (2004). Utility of pedometers for assessing physical activity: Construct validity. *Sports Medicine, 34,* 281-291.

Ulrich, B. (2001). A matter of trust. http://www.nurseweek.com/ednote/01/121701a.html

US Census Bureau US Census (2000). *Demographic Profiles*. http://www.census.gov/Press-Release/www/2002/demoprofiles.html

US Department of Health and Human Services (2000). *Healthy People 2010*

US Department of Health and Human Services (2000). *Physical Activity and Health: A Report ofthe Surgeon General.* Atlanta, GA: USDHHS Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

van Tiel, D., van Vliet, K., & Moerman, C. (1998). Sex differences in illness beliefs and illness behaviour in patients with suspected coronary artery disease. *Patient Education and Counseling, 33,* 143-147.

Verbrugge, L., Reoma, J., & Gruber-Baldini, A. (1994) Short-term dynamics of disability and well-being. *Journal of Health and Social Behavior, 35,* 97-117.

Walcott-McQuigg, J. & Prohaska, T. (2001). Factors influencing participation of African American elders in exercise behaviors. *Public Health Nursing, 18,* 194-203.

Waltz, C., Strickland, O., & Lenz, E. (1991). *Measurement in nursing research.* Philadelphia: F.A. Davis Co.

Wenger, N. (1992). Exclusion of the elderly and women from coronary trials: Is their quality of care compromised? *JAMA,* 268, 1460-61.

White, R. & Evans, C. (2001). Performing the exercise test. *Primary Care, 28,* 29-53.

Wilbur, J., Miller, A., Chandler, P., & McDevitt, J. (2003). Determinants of physical activity and adherence to a 23-week home-based walking program in African American and Caucasian women. *Research in Nursing and Health, 26,* 213-224

Williams, M (2001). Exercise testing in cardiac rehabilitation. Exercise prescription and beyond. *Cardiology Clinics, 19,* 415-431.

Williams, R., Barefoot, C., Califf, R., Haney, T., Saunders, W., Pryor, D., Hlatky, M. Siegler, I., & Mark, D. (1992). Prognostic importance of social and economic resources among medically treated patients with angiographically documented coronary artery disease. *JAMA, 267,* 520-524.

Wilson, J., Chaplain, W., & Thorn, B. (1995). The influence of different standards on the evaluation of pain: Implications for assessment and treatment. *Behavior Therapy, 26,* 217-239.

Wilson, A. & Ross, M. (2000). The frequency of temporal-self and social comparisons in people's personal appraisals. *Journal of Personality and Social Psychology, 78,* 928-942.

Womack, L. (2003). Cardiac rehabilitation secondary prevention programs. *Clinical Sports Medicine, 22,* 135-160.

Wood, J. (1996). What is social comparison and why should we study it? *Personality and Social Psychology Bulletin, 22,* 520-537.

Wood, J. & Taylor, S. (1991). Serving self-relevant goals through social comparison. In J. Suls & T. Wills (Eds.). *Social comparison: Contemporary theory and research.* Hillsdale, NJ: Lawrence Erlbaum Associates, 23-50.

Wood, J., Taylor, S., & Lichtman, R. (1985). Social comparisons in adjustment to breast cancer. *Journal of Personality and Social Psychology, 49,* 1169-1183.

Yates, B., Price-Fowlkes, T., & Agrawal, S. (2003). Barriers and facilitators of self-reported physical activity in cardiac patients. *Research in Nursing & Health, 26,* 459-469.

Young, R. & Kahana, E. (1993). Gender, recovery from late life heart attack, and medical care. *Women & Health, 20*(1), 11-31.

Yu, C., Li, L., Lam, M., Siu, D., Miu, R., & Lau, C. (2004). Effect of a cardiac rehabilitation program on left ventricular diastolic function and its relationship to exercise capacity in patients with coronary heart disease: experience from a randomized, controlled study. *American Heart Journal, 147,* 874-898.